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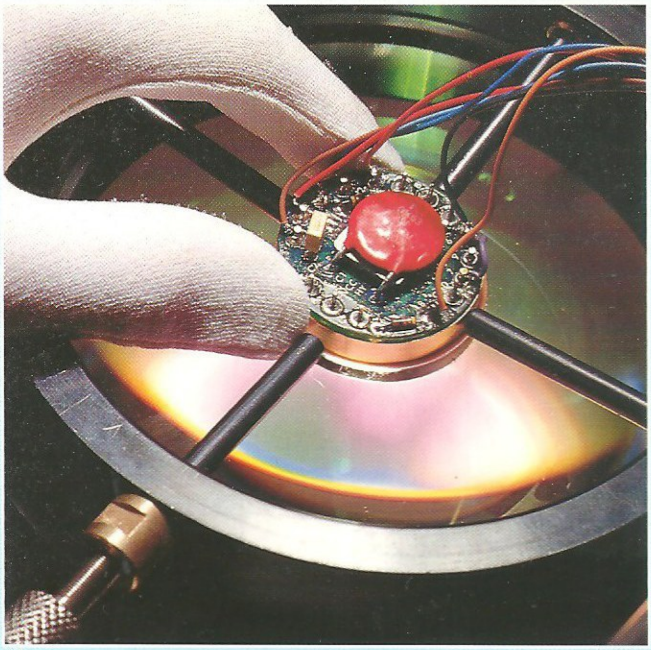
AERIAL AND MARINE SYSTEMS OPERATION



EL-OP GENERAL OVERVIEW

EL-OP is the country's largest electrooptical systems house with complete capability for developing, designing (optics, mechanics and electronics), manufacturing, assembling and testing a wide range of electrooptical sensors and systems.

Founded in 1937, EL-OP has integrated development in leading edge multidisciplinary technologies with the establishment of advanced R&D and production facilities — becoming a major supplier of military systems and products to armed forces and defense contractors across the world.

The company is comprised of a highly efficient team of 1,200 men and women, many of whom are professionally qualified scientists and engineers, supported by skilled technicians and crafts people. EL-OP is organized into separate Operations, each responsible for programs in specific business areas:

☐ Aerial and Marine Systems Operation — covering avionic displays, multisensor stabilized optronic systems, shipborne infrared search and track systems, as well as long range reconnaissance systems.

☐ Ground Systems Operation — covering tank fire control systems, day/night miniature long range observation systems, and line of sight stabilized ground platforms.

☐ Products Operation — covering night vision equipment based on image intensification and thermal imaging (FLIR) technologies, as well as laser systems.

In addition to each Operation's individual capabilities, the company has common support services, including optics manufacturing, mechanics manufacturing, electronics assembly, environmental testing, CAD center, image processing center, stabilization and control center, computation centers and numerous laboratories. EL-OP cooperates with leading research institutes, and has reciprocal manufacturing and licensing agreements with companies in Europe and North America. EL-OP's Operations are situated in Rehovot, Israel, with a proprietary built up area of 30,000 square meters (approx. 300,000 sq. ft.). International subsidiary operations of EL-OP are based in the USA and numerous company offices are located across the five continents.

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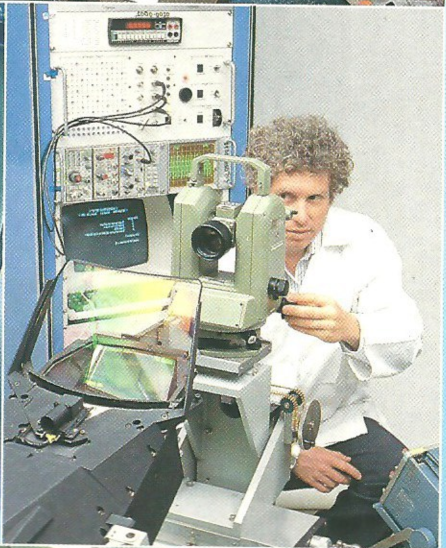
5427A VIBRATION CONTROL SYSTEM



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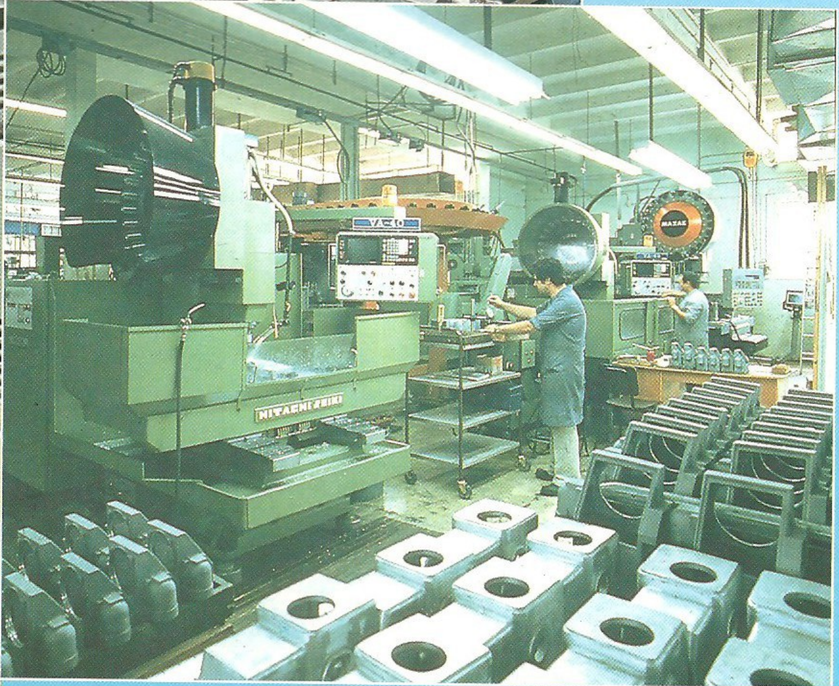
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AERIAL AND MARINE SYSTEMS OPERATION

The Aerial and Marine Systems Operation was established by EL-OP to respond to the growing market of avionic and naval electrooptical systems. The Operation is responsible for development, production, integrated logistic support and quality assurance of all systems installed in airborne or shipborne platforms. Among the Operation's recognized systems and products are: Head Up Displays, Helmet Airborne Displays and Sights, Head Down Displays, Head Out Displays, Multisensor Stabilized Integrated Systems, Laser Trackers and Receivers.

DEVELOPMENT

A dynamic and experienced team of scientists and engineers is responsible for converting current and emerging technologies into operational systems. The professional men and women cover the disciplines of electronics, optics, mechanics, physics, aeronautics, software and system engineering. Using sophisticated CAD tools, development stations and laboratories, the development effort encompasses the engineering building blocks of aerial and marine systems. Capabilities include: digital microprocessor based hardware, analog video hardware, semicustom LSI and hybrid components, image processing, real-time software, optical and optomechanical computerized design and analyses, as well as heat exchange, stress and finite element analyses.

PRODUCTION

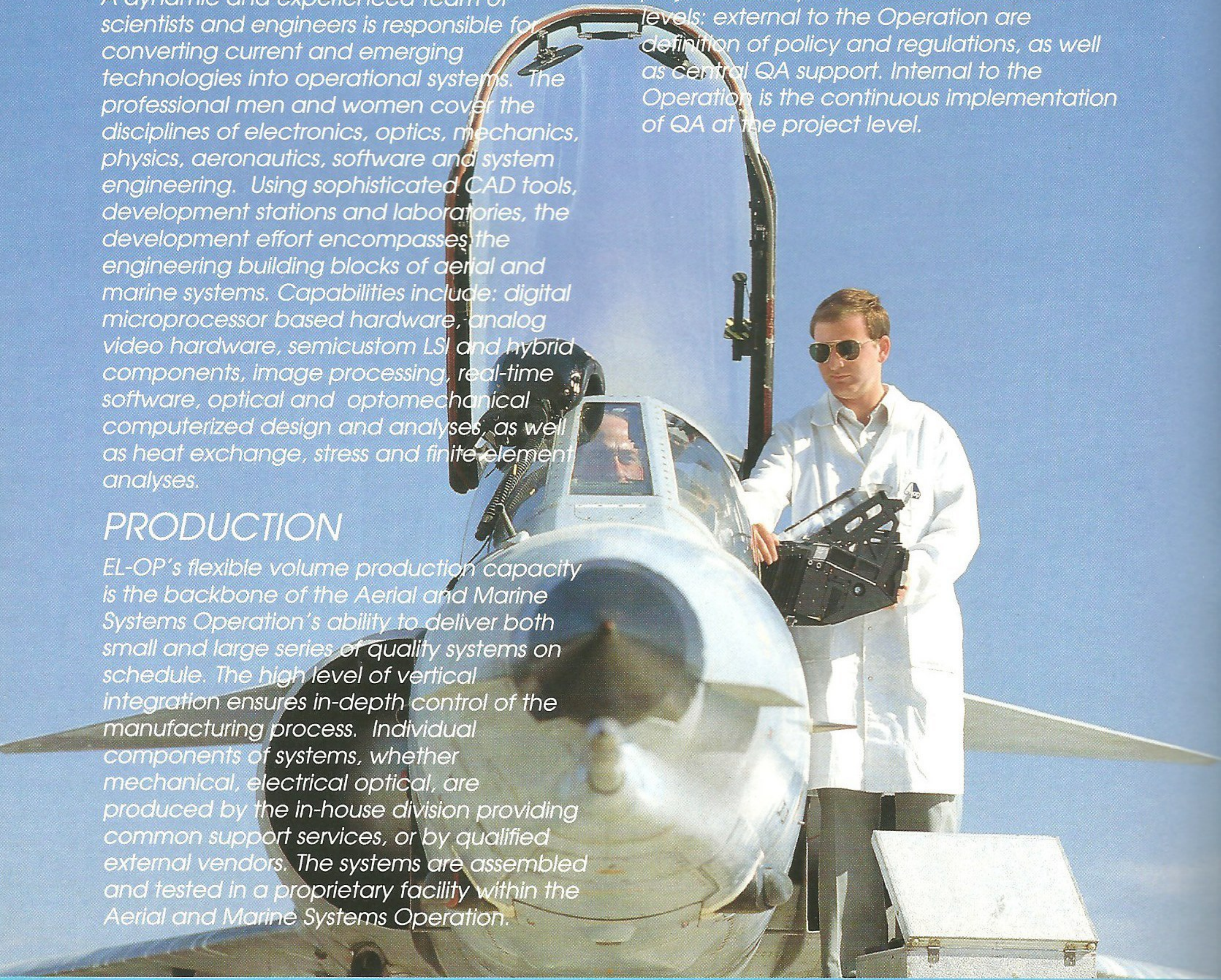
EL-OP's flexible volume production capacity is the backbone of the Aerial and Marine Systems Operation's ability to deliver both small and large series of quality systems on schedule. The high level of vertical integration ensures in-depth control of the manufacturing process. Individual components of systems, whether mechanical, electrical optical, are produced by the in-house division providing common support services, or by qualified external vendors. The systems are assembled and tested in a proprietary facility within the Aerial and Marine Systems Operation.

INTEGRATED LOGISTIC SUPPORT (ILS)

Parallel to the development and production of systems, the Aerial and Marine Systems Operation's responsibility cover the full extent of ILS. This includes reliability and maintainability, test equipment, training, documentation, provisioning, and technical assistance. The Operation's project-oriented organization ensures a focal point between the customer and the system's development, production and ILS.

QUALITY ASSURANCE (QA)

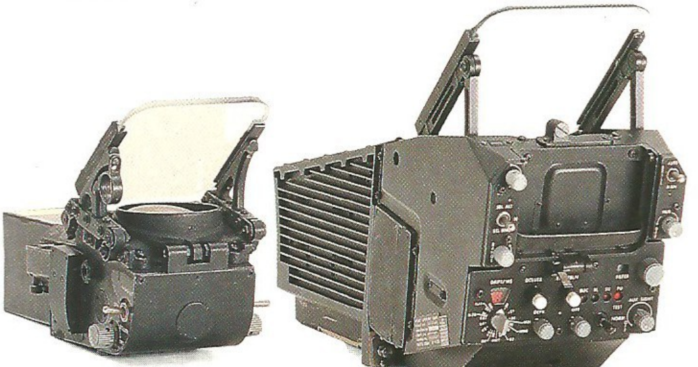
In line with EL-OP's policy as a manufacturer of high quality products, the company supports an extensive quality assurance system, throughout the life-cycle of a project. Quality assurance is run at two levels: external to the Operation are definition of policy and regulations, as well as central QA support. Internal to the Operation is the continuous implementation of QA at the project level.

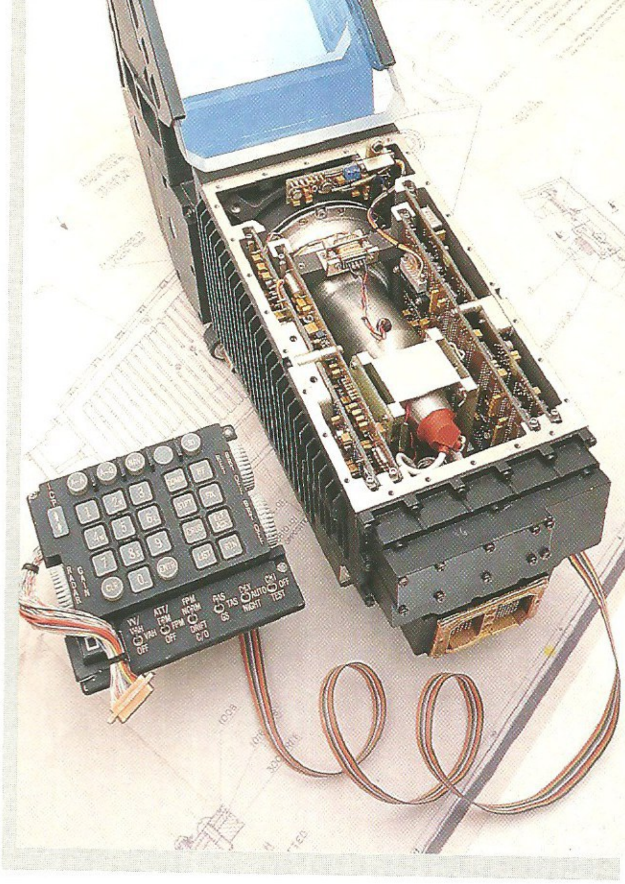


PRODUCT AREAS

HEAD UP DISPLAYS (HUD)

EL-OP is one of the worlds' foremost producers of Head-Up Displays (HUD). The HUDs, designed in a wide range of configurations, are installed in combat aircraft. They provide the pilot with visual displays of navigation and weapon delivery data.

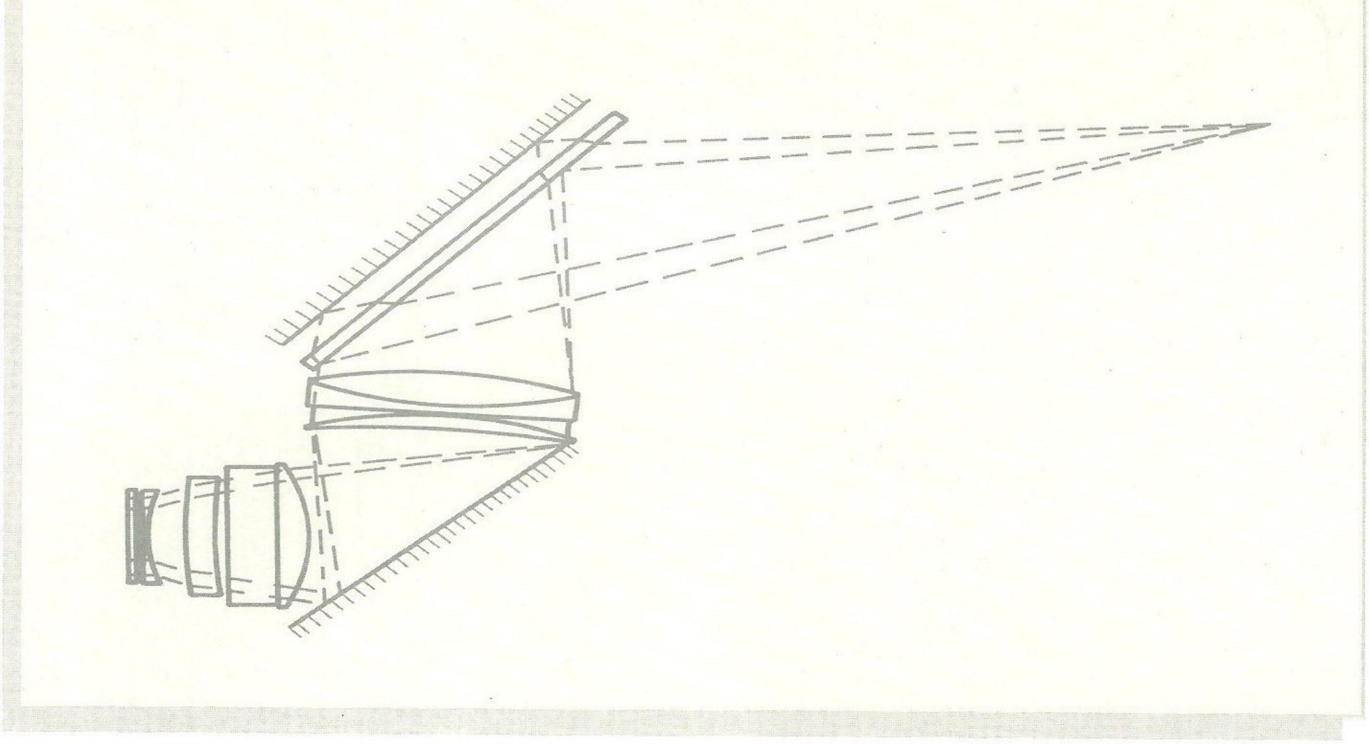


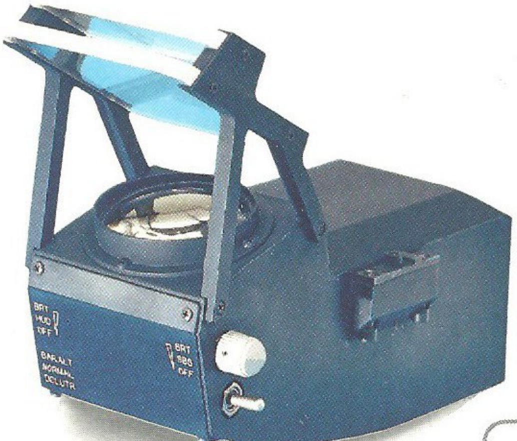


EL-OP started deliveries of HUDs during the early 1970's for Skyhawk A-4 and Kfir C-2 Israel Air Force fighters. During the early 1980's, EL-OP developed new concepts for HUD, based on the latest technological advances. The new family of HUDs joins the battle-proven HUDs produced by EL-OP's Aerial and Marine Systems Operation.

The most widely supplied HUDs include units designed for mid-size cockpits. The HUDs are characterized by an optic aperture diameter of 5" and provide typically a total circular field of view of 24°. These HUDs are available in several configurations: the Pilot Display Unit (PDU) and Electronics Unit (EU) are separate LRUs; the Power Supply Unit (PSU) may be separate or built-in to the PDU; the HUDs may contain raster/stroke display capability, or alternatively stroke display capability only.

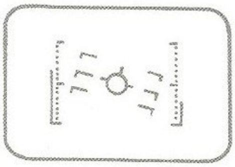
A Cockpit TV Sensor (CTVS) may be integrated with the PDU for video recording of the HUD scene viewed by the pilot. Several types of Up Front Control Panels (UFCP) providing efficient aircraft-HUD interface through human engineering, are available. The PDUs may also be supplied with one of several combiner configuration, depending on the user's specific needs.

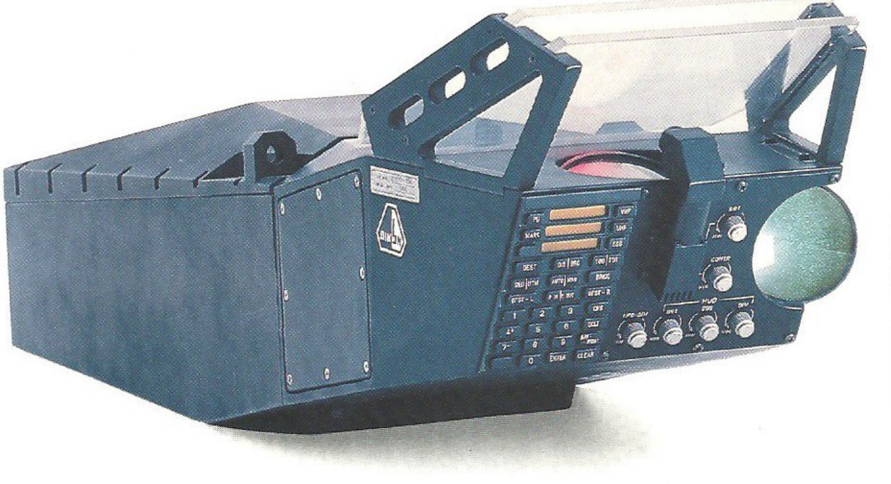


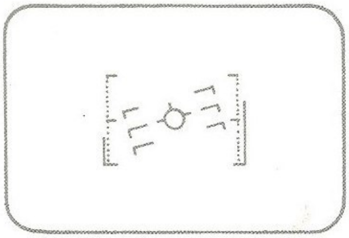


HUDs designed and manufactured for small-size cockpits are characterized by an optics aperture diameter of 3"-4" and provide typically a total circular field of view of 20°. These small HUDs carry on the tradition of the miniature HUD systems produced for the Skyhawk A-4 aircraft.

HUDs designed for large-size cockpits are characterized by an optics aperture diameter of 5"-7" and provide typically a total field of view of 24° to 30°. These HUDs merge in the same LRU all the functional components of the system (including the display processor) as well as the option for an auxiliary collimated head down display.







DISPLAY UNIT
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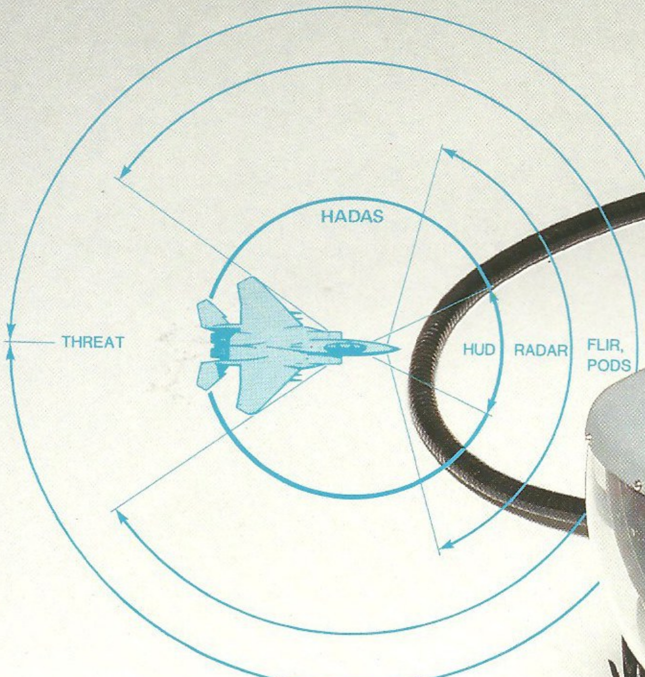
HELMET AIRBORNE DISPLAY AND SIGHT (HADAS)


HADAS
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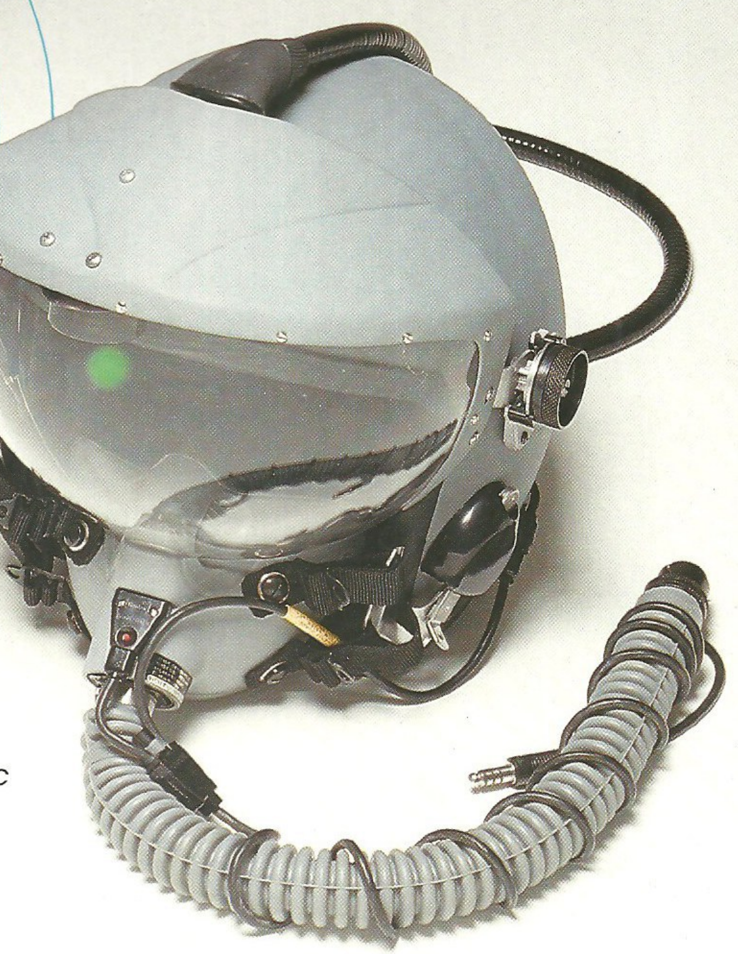
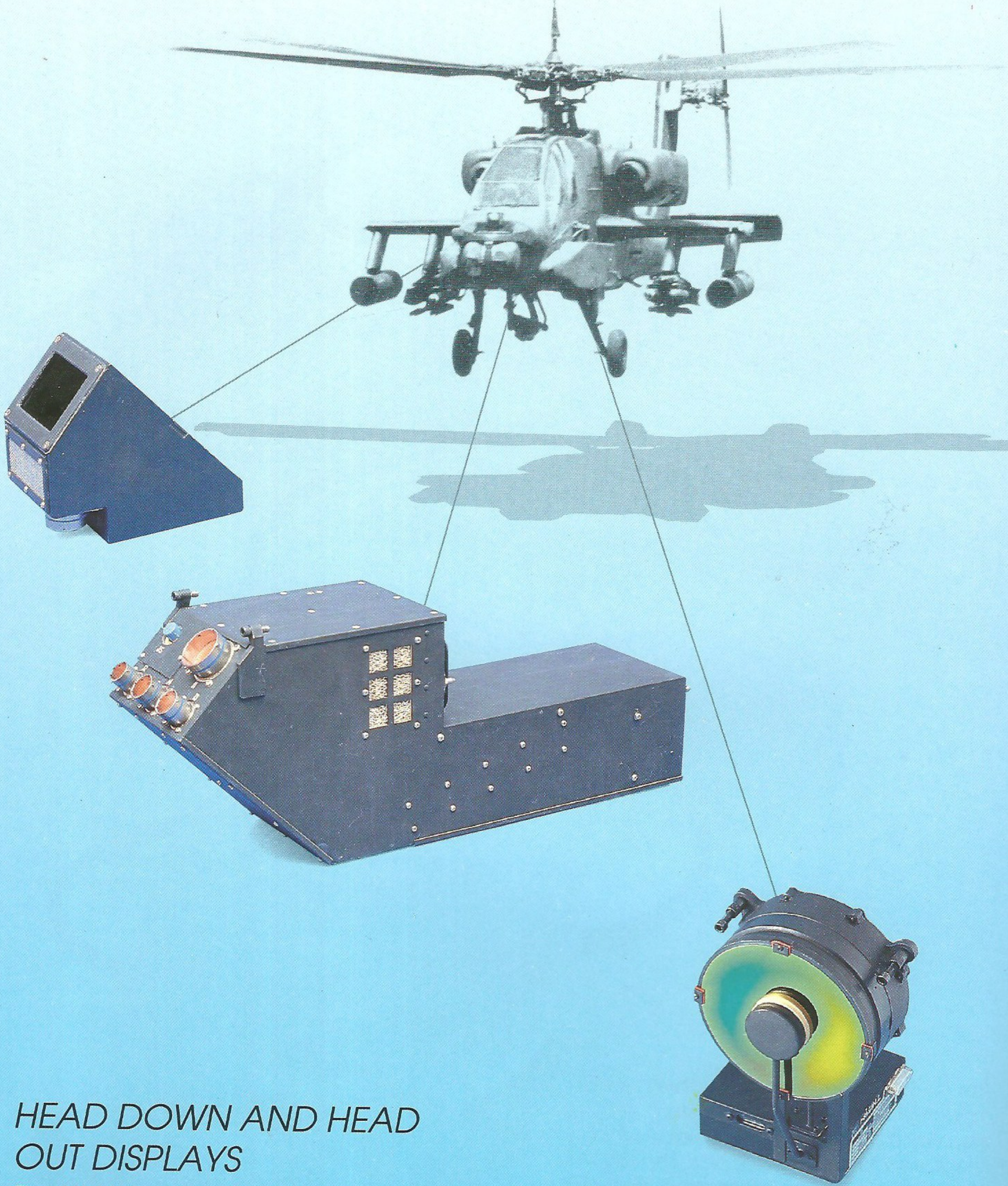


The HADAS system, an innovative helmet mounted display and sight system, provides the pilot a global head up display when integrated to aircraft avionics. The HADAS system displays flight information, navigation and weapon delivery data, TV or FLIR imagery, and sensor cues. The wide field of view display is achieved by incorporating holographic optical elements and fiber optic image transmission in the design. The high accuracy sight is established using noncontact electrooptical line of sight measurement.

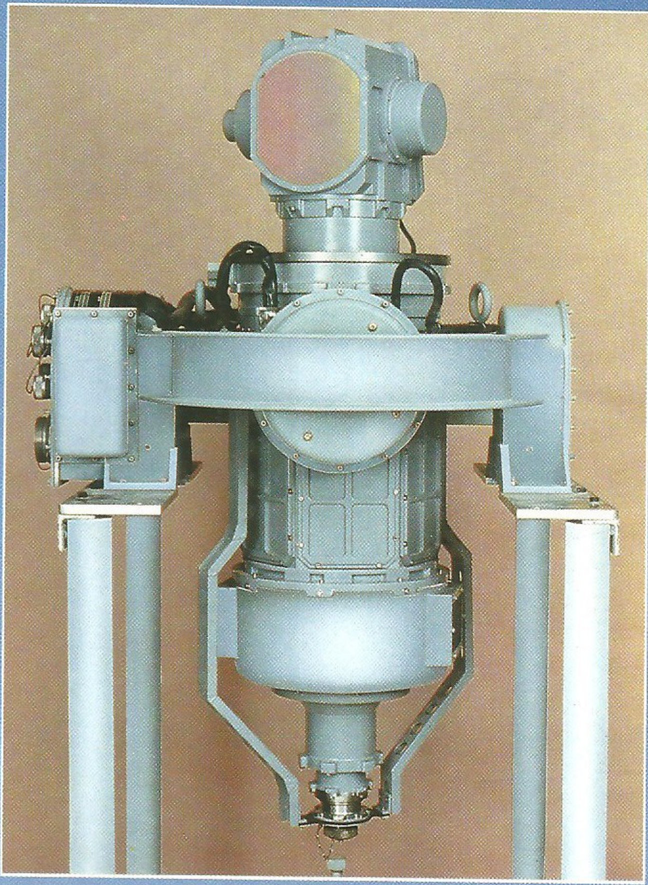


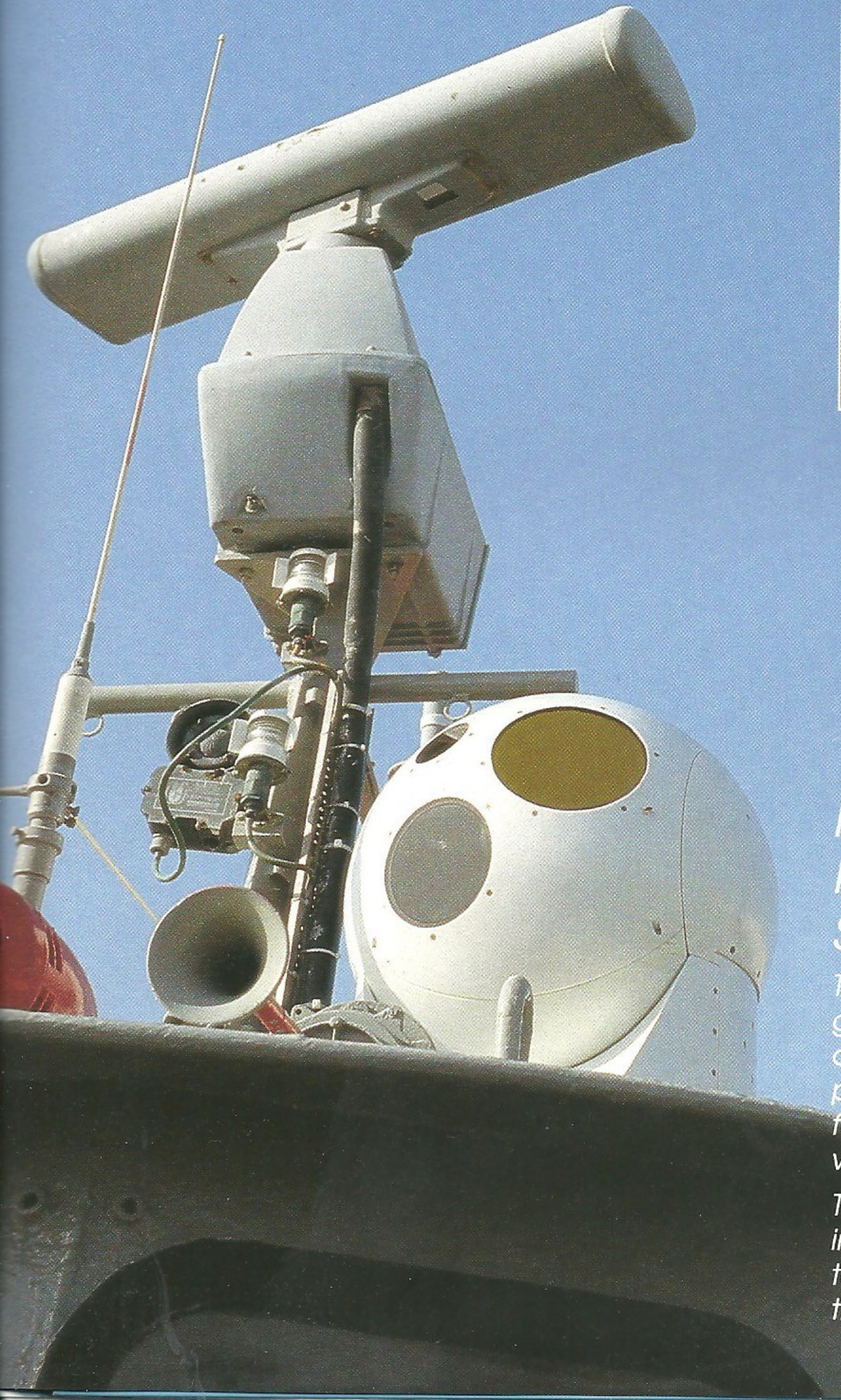
HEAD DOWN AND HEAD OUT DISPLAYS

The AH-64 Apache attack helicopter contains the TADS/PNVS (Target Acquisition Designation System/Pilot Night Vision System). EL-OP is the major supplier of Head Out Displays and Head Down Displays, as well as the Laser Trackers/Receivers for this major electrooptical system under contract from the Martin Marietta Corp.

SHIPBOARD PASSIVE INFRA-RED TARGET ACQUISITION SYSTEM (SPIRTAS)

The SPIRTAS, a shipboard thermal imaging radar, provides a sophisticated, highly sensitive, passive search net for threats. Developed in response to the need for detection of low flying antiship missiles, the system uses advanced infra-red technology to locate aircraft, surface craft and missiles during day or night. Shipboard Infra Red Search and Track (IRST) systems from EL-OP provide the solution for the challenging scenarios of modern naval combat.





MULTISENSOR STABILIZED INTEGRATED SYSTEM (MSIS)

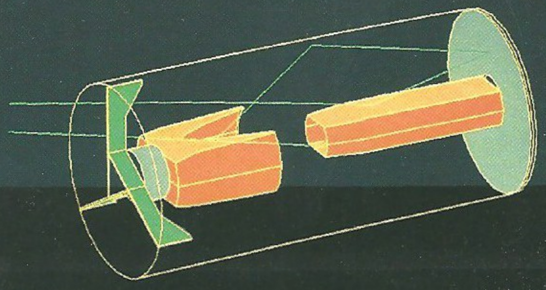
The MSIS, consisting of highly stabilized gimbals containing a FLIR system, a TV camera, and a laser rangefinder, provides a powerful integrated multisensor capability for day and night operations under all weather conditions.

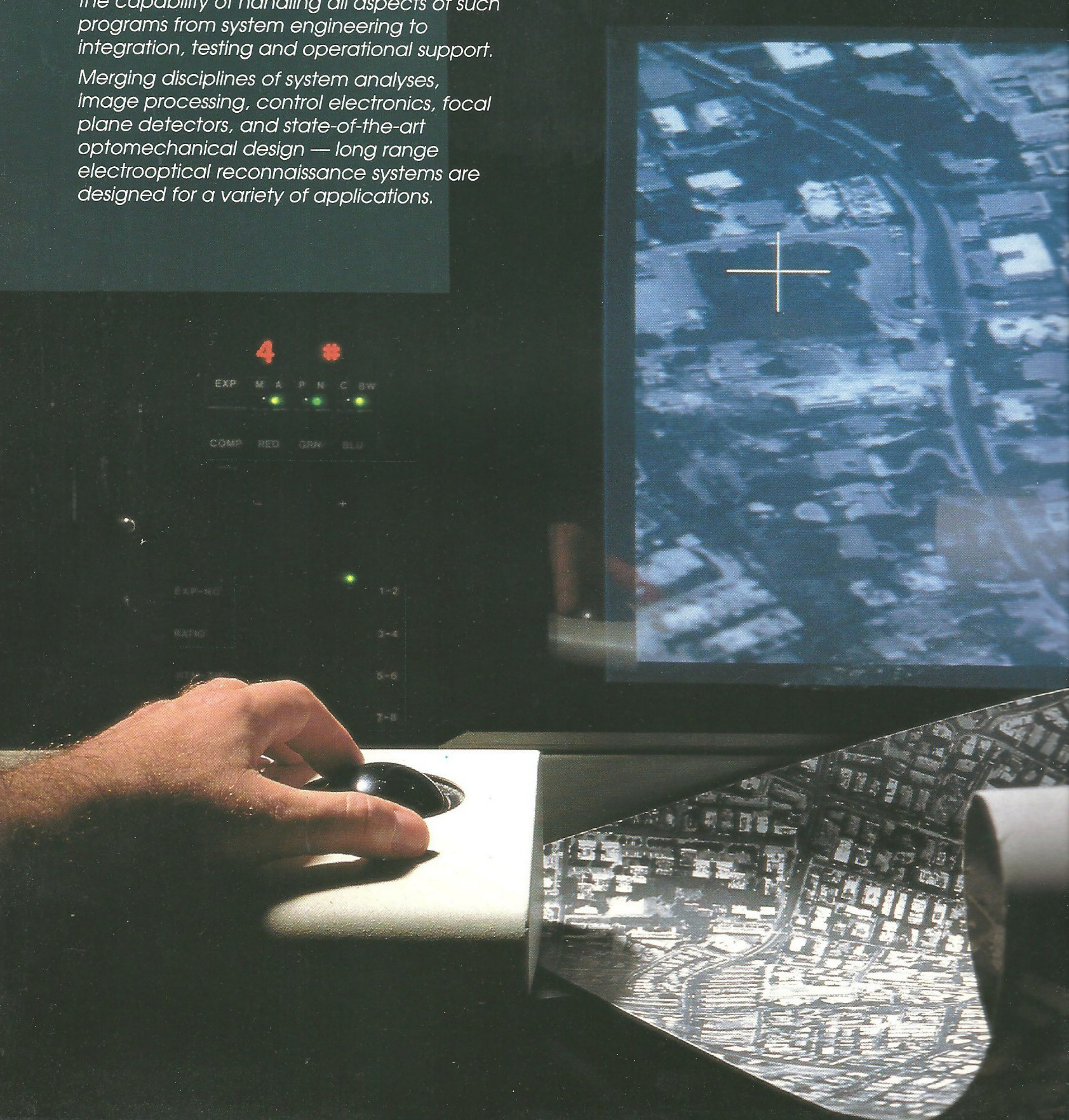
The system is designed specifically for installation aboard naval vessels to enable target detection, recognition, ranging and tracking, along with fire control.

LONG RANGE RECONNAISSANCE

EL-OP is the prime source of systems in the area of electrooptical reconnaissance and image archive management. With the accumulated experience in these domains, the Aerial and Marine Systems Operation has the capability of handling all aspects of such programs from system engineering to integration, testing and operational support.

Merging disciplines of system analyses, image processing, control electronics, focal plane detectors, and state-of-the-art optomechanical design — long range electrooptical reconnaissance systems are designed for a variety of applications.





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...to carry out a successful mission

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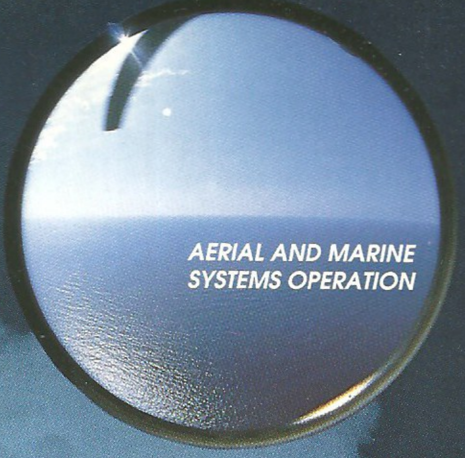


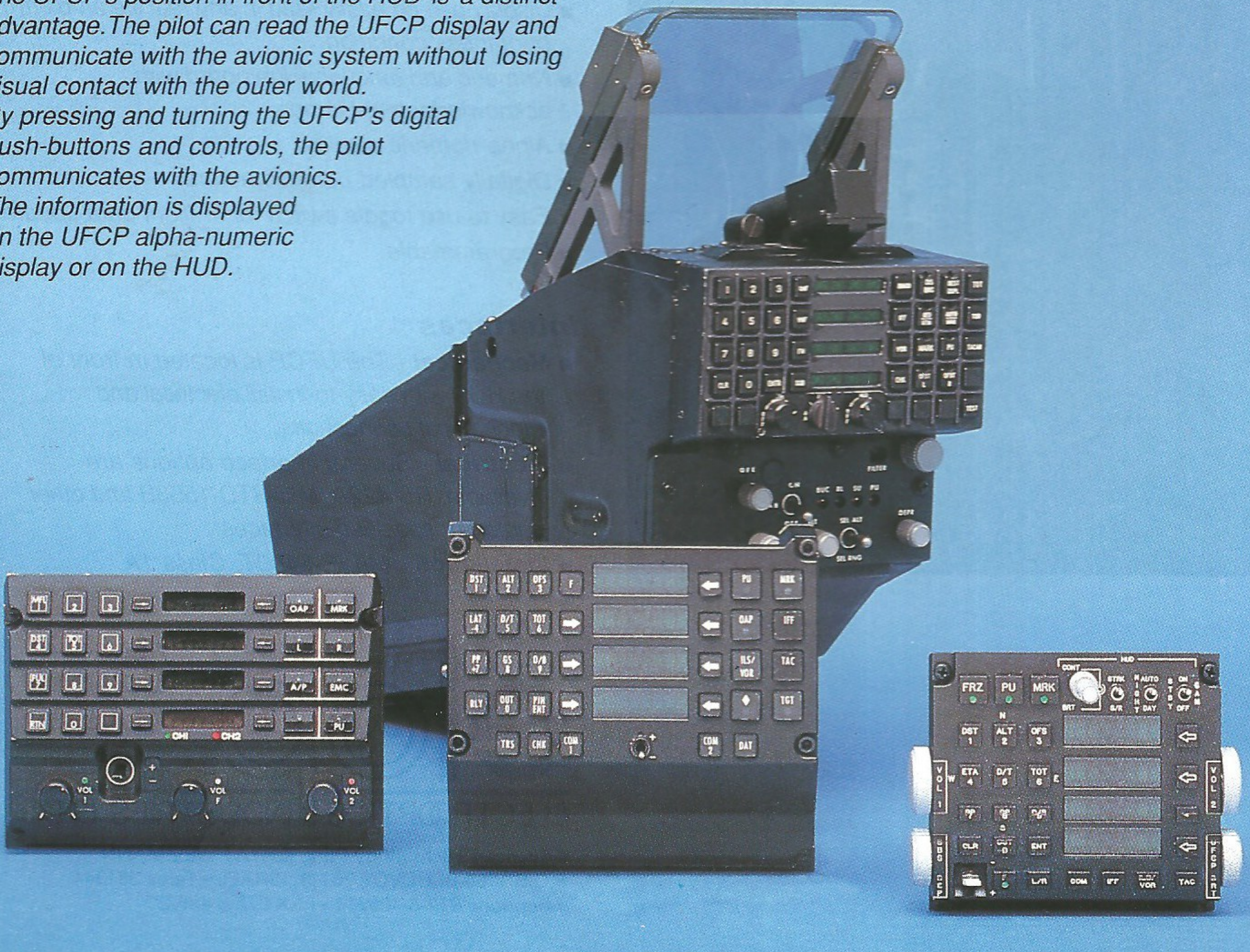
AERIAL AND MARINE SYSTEMS OPERATION

UFCP

Up Front Control Panel

The Up Front Control Panel is the pilot's input and control terminal for activating and operating the avionic system from a centrally located position. It is installed in the front part of the Head-Up Displays (HUD) of advanced and modernized aircrafts to constitute the main man / machine interface between the pilot and the aircraft's computer.

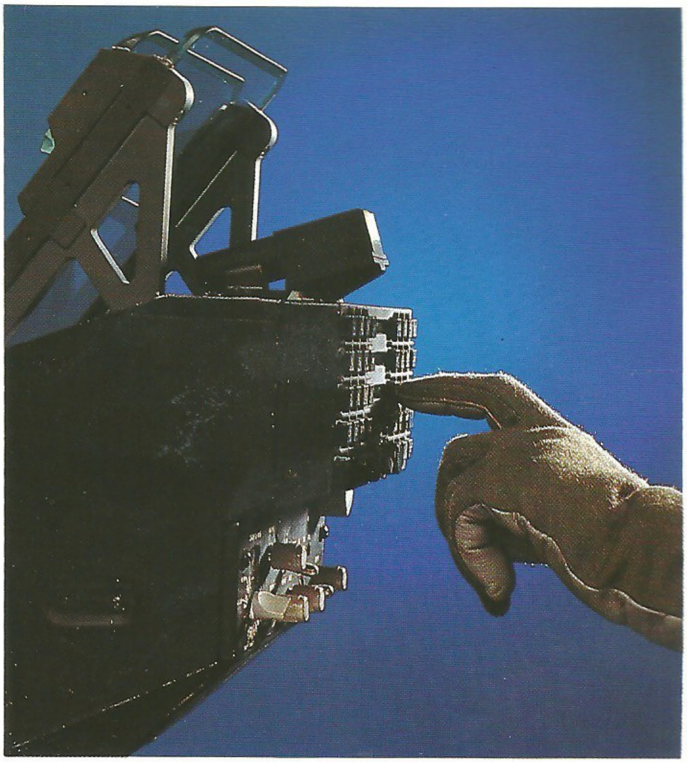
The UFCP's position in front of the HUD is a distinct advantage. The pilot can read the UFCP display and communicate with the avionic system without losing visual contact with the outer world. By pressing and turning the UFCP's digital push-buttons and controls, the pilot communicates with the avionics. The information is displayed on the UFCP alpha-numeric display or on the HUD.



UFCP

Functions

- *Pilot's Control Terminal of aircraft's Avionic System.*
- *Pilot's Input Terminal for digital information.*
- *Pilot's Display for vital alpha-numeric information supplied by the aircraft's computer.*



Main Features

- *Display can be easily read in any real life ambient brightness condition.*
- *Numeric and functional keyboard with acknowledgement lamps.*
- *Alpha-numeric display.*
- *Digitally sampled potentiometers.*
- *Easy to use toggle switch for in-flight data updates.*
- *Programmable.*

Interfaces

- ***Mechanical** - The UFCP is located in front of the HUD with easy-to-install electrical and mechanical connections.*
- ***Electrical** - Several interface options are available: RS-422A, MIL-STD-1553B and other customer specified interfaces.*
- ***Installation** - MIL-E-5400T, Class 1A.*

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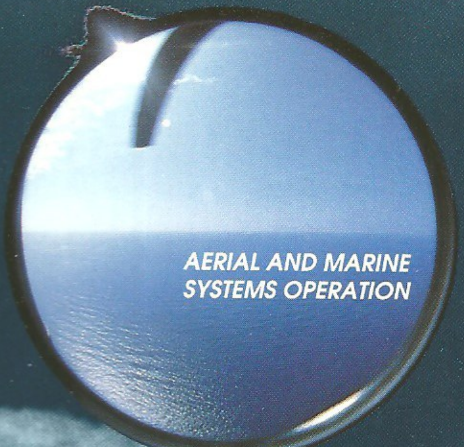


AERIAL AND MARINE SYSTEMS OPERATION

AURORA

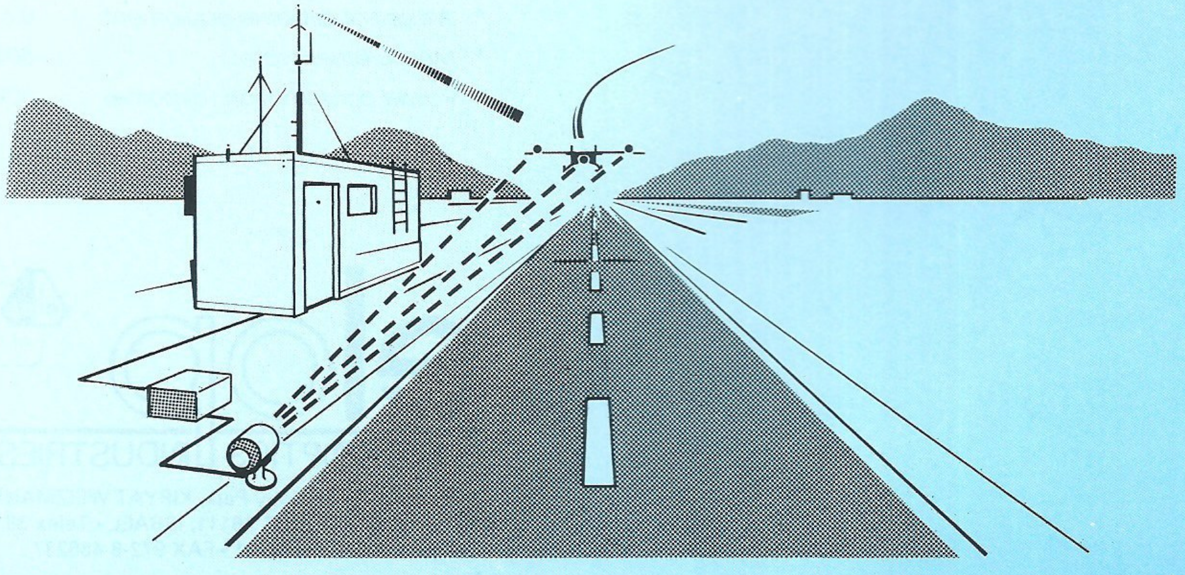
Automatic Recovery of Remotely Piloted Aircraft

The automatic recovery system of RPV (Remotely Piloted Vehicle)/UAV (Unmanned Air Vehicle), currently under development, replaces the "man in the loop" during guidance of air vehicles to final approach and wheeled or net captured type landing.

The system incorporates a very accurate, electrooptical sensor capable of providing precise, six degrees of freedom, location and attitude data of the RPV/UAV. The system communicates directly with the RPV/UAV control station to transmit final approach flight control guidance signals.

Main features include:

- *Cost reduction of RPV/UAV crash-landing losses*
- *Minimized need for training of highly skilled personnel involved in the landing process*
- *Operation during day/night and adverse weather conditions*
- *Ground based system, with minimal weight penalty to the RPV/UAV*
- *Simple interface to the main control station*
- *High accuracy measurement in all six degrees of freedom*



AURORA

System Configuration

RPV/UAV mounted:

- *Miniature light sources installed on the RPV/UAV*

Ground installed:

- *Electrooptical sensor*
- *Microcomputer unit*
- *Communication interface to the control station*

Major Characteristics

Measurement accuracy:	*Angular-3 mRad RMS* *Translational-0.05 m*
Detection range:	*2 km max.*
Angular coverage:	*15°*
Weight of airborne equipment:	*0.6 kg/1.3 lbs.*
Measurement rate:	*80 Hz*
Power consumption (airborne):	*50W at 28 Vdc*

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AERIAL AND MARINE
SYSTEMS OPERATION

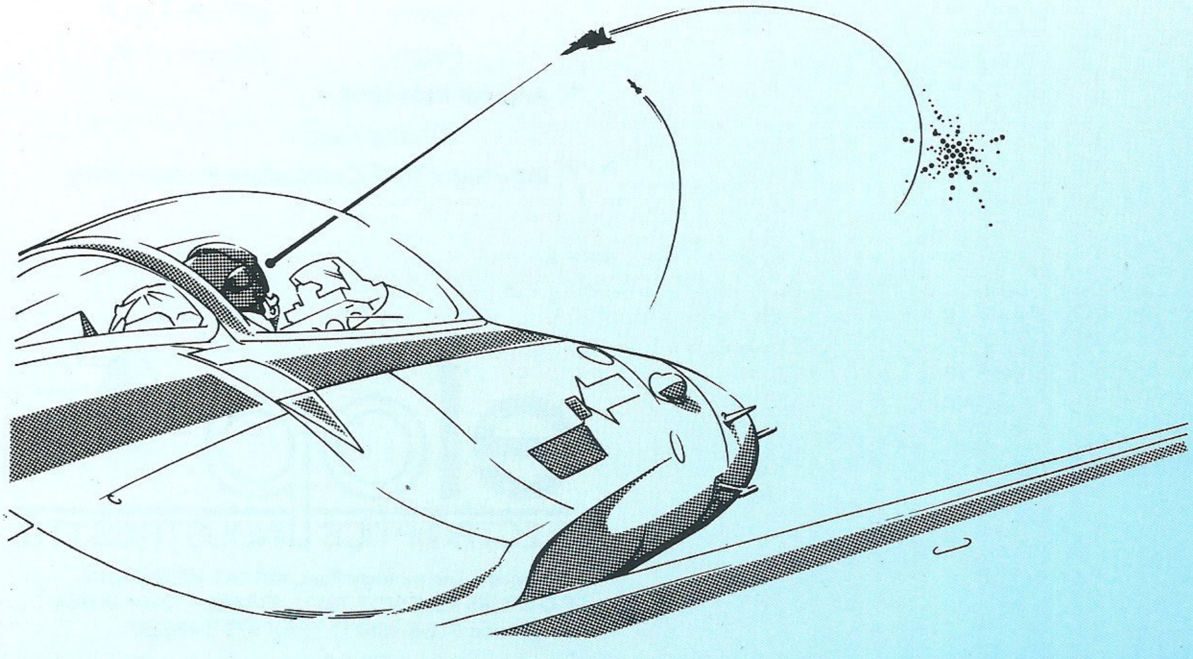
Knight's Eye

High Accuracy Helmet Mounted Sight System

The Knight's Eye high accuracy helmet mounted sight system provides precision non-contact electrooptical Line-Of-Sight (LOS) measurement of the pilot in aircraft and helicopter platforms.

The system consists of a LOS Measurement Computer, a LOS Measurement Sensor, and an array of add-on symbols adaptable to any helmet configuration. The system is designed specifically to enable wide angle accurate target acquisition in combination with weapons and sensor for air-to-air, air-to-ground, navigation and night missions.

Knight's Eye may be readily integrated with helmet mounted displays in existing or new aircraft systems.



Knight's Eye

Major Characteristics

- ***Accuracy*** *(Measured)*
    - *2 mRad RMS over central +30°*
    - *5 mRad RMS over remaining field of regard*
- ***Effective Update Rate***
    - *120 Hz*
- ***Angular Operation Limits*** *(Nominal)*
    - *Azimuth +160°*
    - *Elevation + 90°, –70°*
    - *Roll + 60°*
- ***Head-Motion Box Dimensions*** *(Typical)*
    - *Length 500 mm / 19.5"*
    - *Width 400 mm / 15.7"*
    - *Height 200 mm / 7.8"*
- ***Angular Rate Limit***
    - *150 deg / sec*
- ***Day/Night NVG Compatible Performance***

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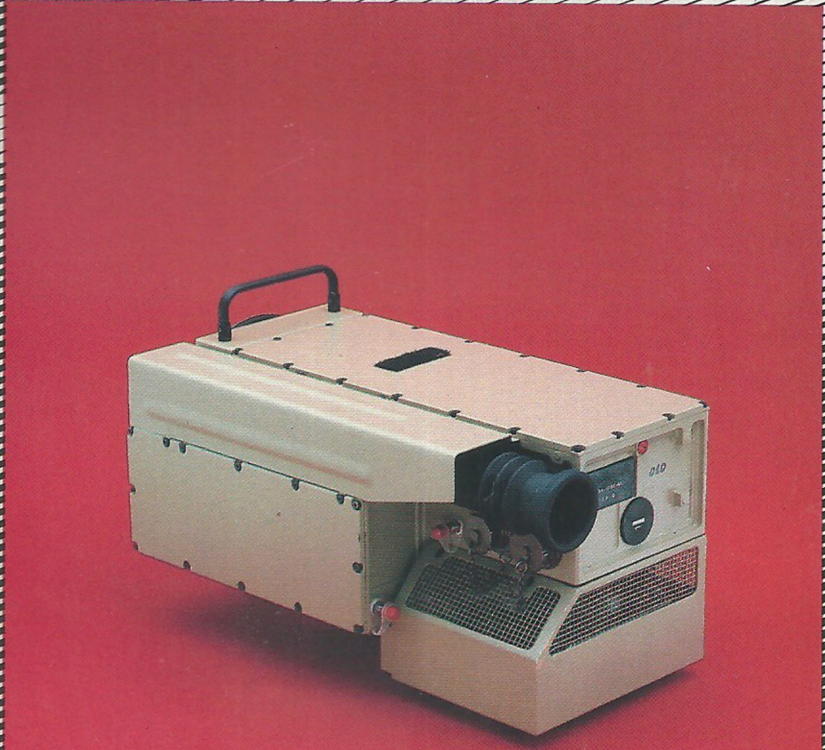
HR LR-94

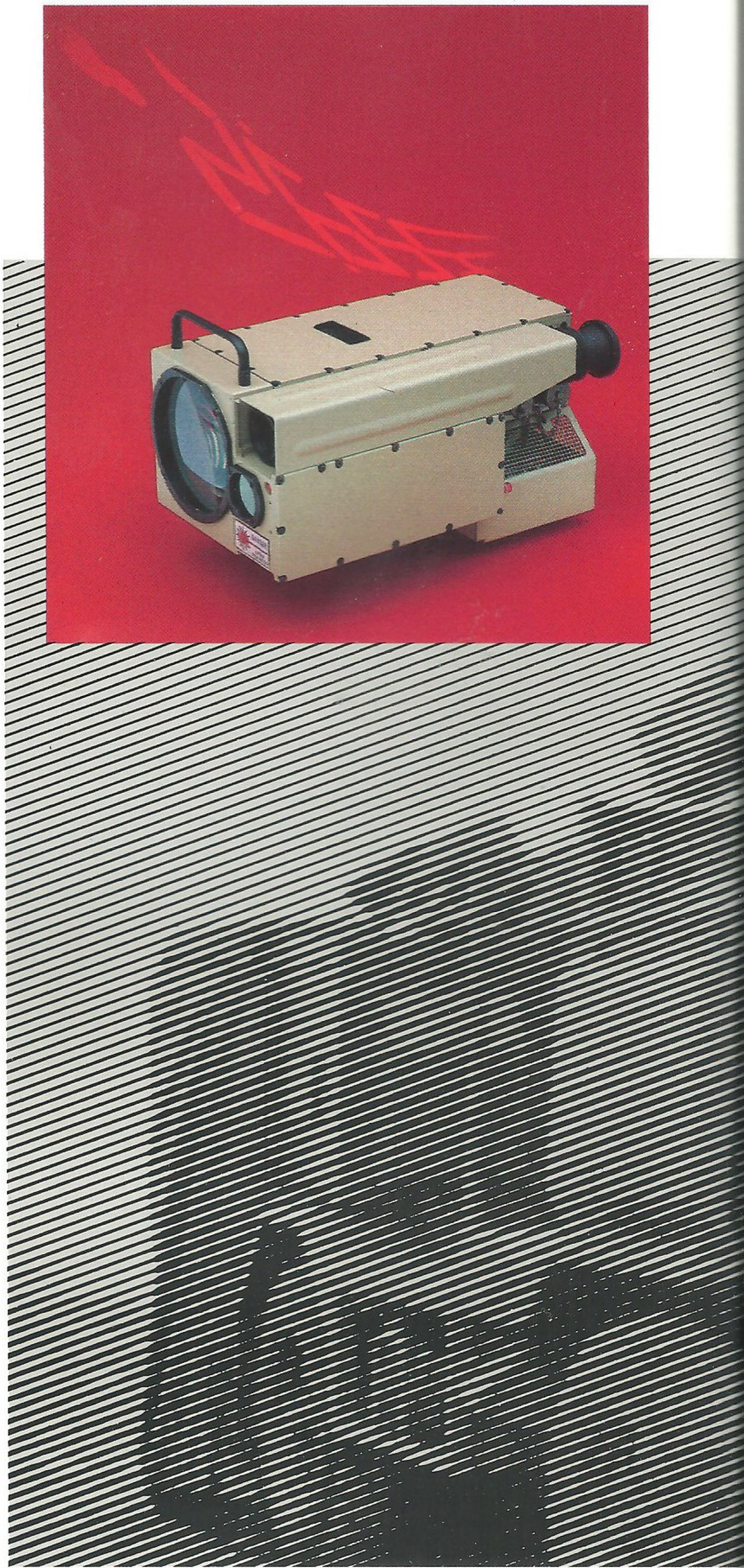
High Repetition Laser Rangefinder



- Stand-alone Configuration
- A/A Integrated Configuration

HRLR-04

High Repetition Laser Rangefinder



TARGETING YOUR A/A REQUIREMENTS: A LOW COST LASER RANGEFINDER THAT INCREASES ACCURACY AND SURVIVABILITY

The El-Op High Repetition Laser Rangefinder (HRLR) was developed in direct response to combat feedback. Concentrating under one roof the skills and experience required to research, develop, manufacture and test systems incorporating all the major electro-optic technologies and to integrate them with advanced electronics, El-Op is a major supplier in its field. Its Laser Rangefinders have repeatedly proven their effectivity in the most challenging combat scenarios.

The HRLR translates El-Op technologies and experience into a low-cost system which improves accuracy of measurement while increasing survivability in hostile environments.
The HRLR may be applied as a stand-alone unit or integrated into Anti-Aircraft (A/A) Gun Systems.

INTEGRATES WITH A/A GUN SYSTEMS

The HRLR is lightweight and compact, and has a rigid structure. It is microprocessor-controlled with a serial communications output.
The HRLR's small dimensions, and high, flexible performance make it easy to integrate the unit into A/A Gun Systems. The addition of a HRLR to existing A/A Gun Systems increases their effectivity against modern air threats by improving hit probability. The passive mode of the system, on the other hand, reduces the possibility of detection and thus increases survivability.

MORE ACCURACY ■ MORE VERS

FEATURES

As a very compact stand-alone unit, the HRLR has proven itself as a highly effective system. The transmitter features versatile beam divergence. The highly sensitive receiver offers a flexible field of view. These features can be adapted to customer specifications.

OPERATING MODES

The HRLR has three operating modes:
LASER ON — this mode is operative from the moment the HRLR is connected to a power source.
LASER STANDBY — the simmer power supply is operative and the laser is ready for fire command.
LASER FIRE — the laser transmits energy in S.S., 10 and 20 Pulses Per Second (PPS).

TILITY ■ MORE SURVIVABILITY

HRLR-04

High Repetition Laser Rangefinder

TECHNICAL DATA

Transmitter

Wavelength: 1064 nm (Nd:YAG)
Output energy: 80 mJ (Per pulse)
Pulse repetition freq.: Single shot, 10 to 20 PPS
Beam divergence: Between 3 to 6 mrad (for 90% of output energy) — factory predetermined
Duty cycle: 100%
External sync.: Available

Receiver

Range: 300 to 19995 m
Sensitivity: 57 DB
Range accuracy: ±5m
Range discrimination: Variable between 300 to 12000 m
F.O.V.: 3 to 6 mrad (factory predetermined)

Boresight Telescope

Magnification: x6
Boresight (to laser beam): Less than 0.5 mrad
Eye protection laser radiation: 40 dB min. at 1064 nm

Electrical Interface

The Electronic Unit is controlled by mp (MCS-51 family) with Serial Communication (half or full duplex) for operating commands and for range/status information.
Max. power consumption (at 28 VDC): 280 W

Mechanical Interface

Weight: Less than 13 kg.

Environmental Conditions

Per MIL-810C

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HRLR-ES

EYESAFE LASER RANGEFINDER

DEFINITION: Versatile high repetition laser rangefinder designed for Anti Aircraft Gun Systems

PERFORMANCE:

• Transmitter (Nd: YAG)	1.54 μm
– Output energy	20 mJ typ. per pulse
– Repetition rate	up to 20 pps
– Beam divergence	0.5 ÷ 2 mRad
• Receiver	
– Min. range	250 m
– Max. range	19,995 m
– Range accuracy	±5 m
– FOV	2 mRad typ.
– Range gate	from 0.3 to 15 km
• Boresight telescope	x 6 (3.5° FOV)
• Weight (less than)	14 kg
• Dimensions typ. (mm)	430 x 260 x 220
• Power	28 Vdc
• Environmental conditions	
– Operational temperature	−32°C to +55°C
– Non operational temperature	−40°C to +71°C

FEATURES:

- Highly miniaturized modular structure, easily adaptable to custom needs • Thermally stable design • Ranging operation cannot be jammed
- Increased survivability of the AA Gun System
- Modern communication link software adaptable protocol

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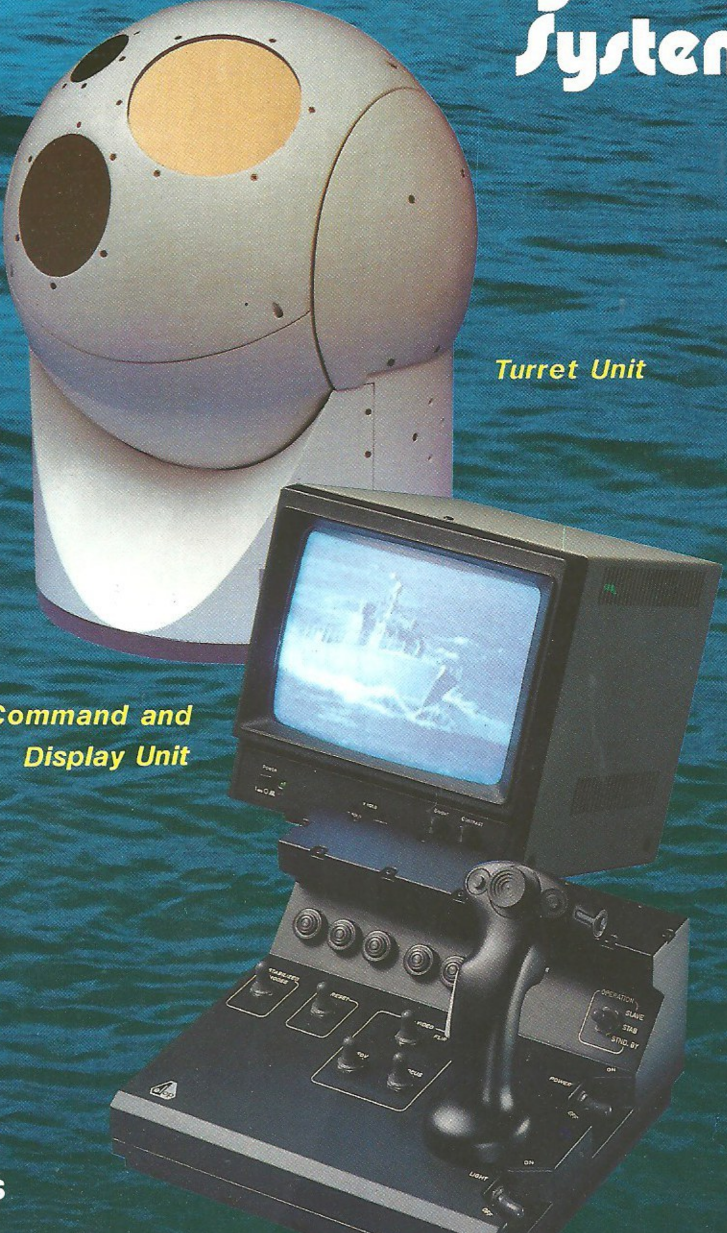
MSIS

Multisensor Stabilized Integrated System

The **Multisensor Stabillized Integrated System** *(MSIS)*, consisting of FLIR system, TV camera, and laser rangefinder, provides a powerful integrated multisensor capabilities for day and night operations under all weather conditions.

The system is designed specifically for installation aboard naval vessels to enable target detection, recognition, acquisition, identification and tracking, along with fire control of guns up to 76 mm.



Turret Unit

Command and Display Unit

Main Features

The **MSIS**, featuring a four-axis gimballed platform offering wide-angle pointing coverage combined with a high level of stabilization, provides the following advantages.

- **Very small size and low weight**
- **High-performance, Stabilization, Sensitivity and Resolution**
- **Flexible sensor packaging**
- **Highly flexible interfacing with shipboard acquisition and fire control systems**
- **Operational capability under extreme environmental conditions**
- **High jamming immunity**

MSIS

Multisensor Stabilized Integrated System

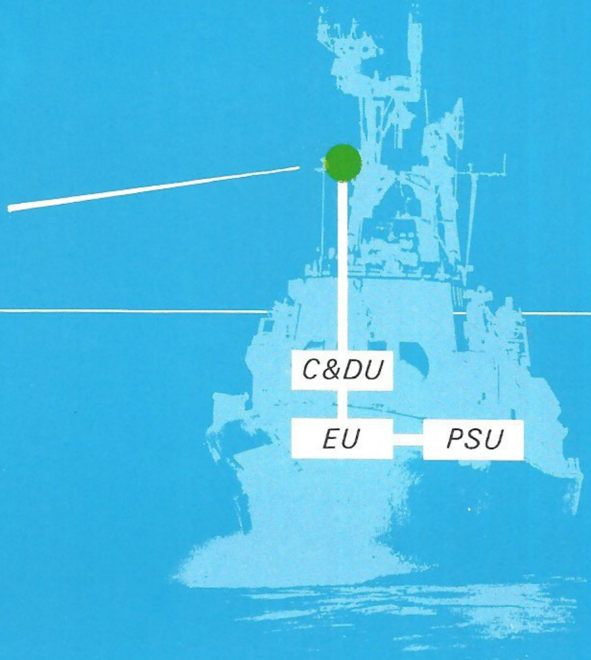
System Components

Above Deck Components:

- Stabilizing Unit
- FLIR
- TV Camera
- Laser Rangefinder

Below Deck Components:

- Video Tracker
- Command & Display Unit
- Electronic Unit
- Power Supply Unit



Major Characteristics

LOS Stabilization	better than 20 urad	
Laser Range Measurement	any range between 300 meters and the recognition range	
Angular Coverage	Azimuth	n x 360°
	Elevation	-15° to 85°
Maximum slewing Rate	60°/sec	
Weight	Turret	60 kg
	Total system	100 kg
Dimensions	Turret Diameter	550 mm
	Turret Height	650 mm

Detection and Recognition Range (in meters):

Target	Size (m)	Detection Range		Recognition Range	
		FLIR	Daylight Camera	FLIR	Daylight Camera
Missile Boat	4 x 6	17,000	12,000	8,200	6,500
Aircraft	2.5 x 4	16,000	9,000	5,900	5,000
Dinghy	1.5 x 1	6,500	6,500	2,100	3,500

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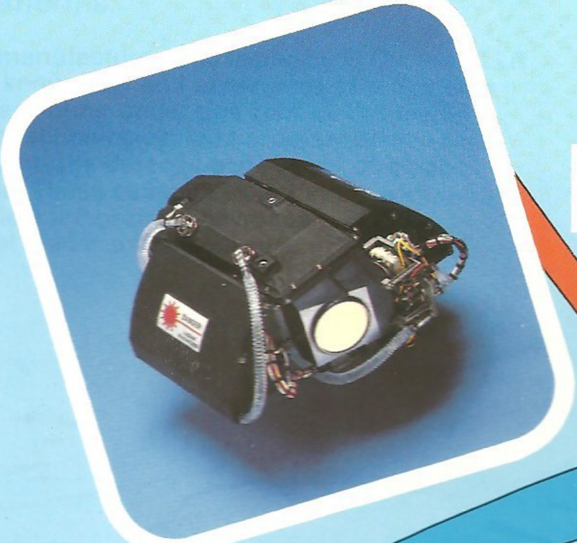
VLLR-1

Very Lightweight Laser Rangefinder



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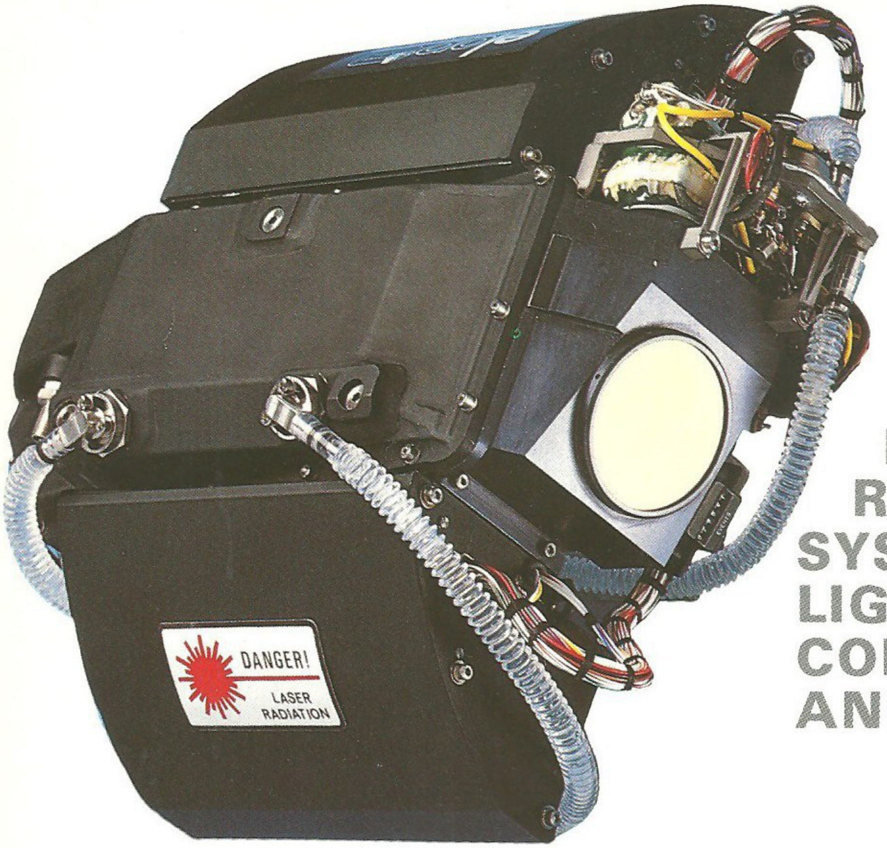
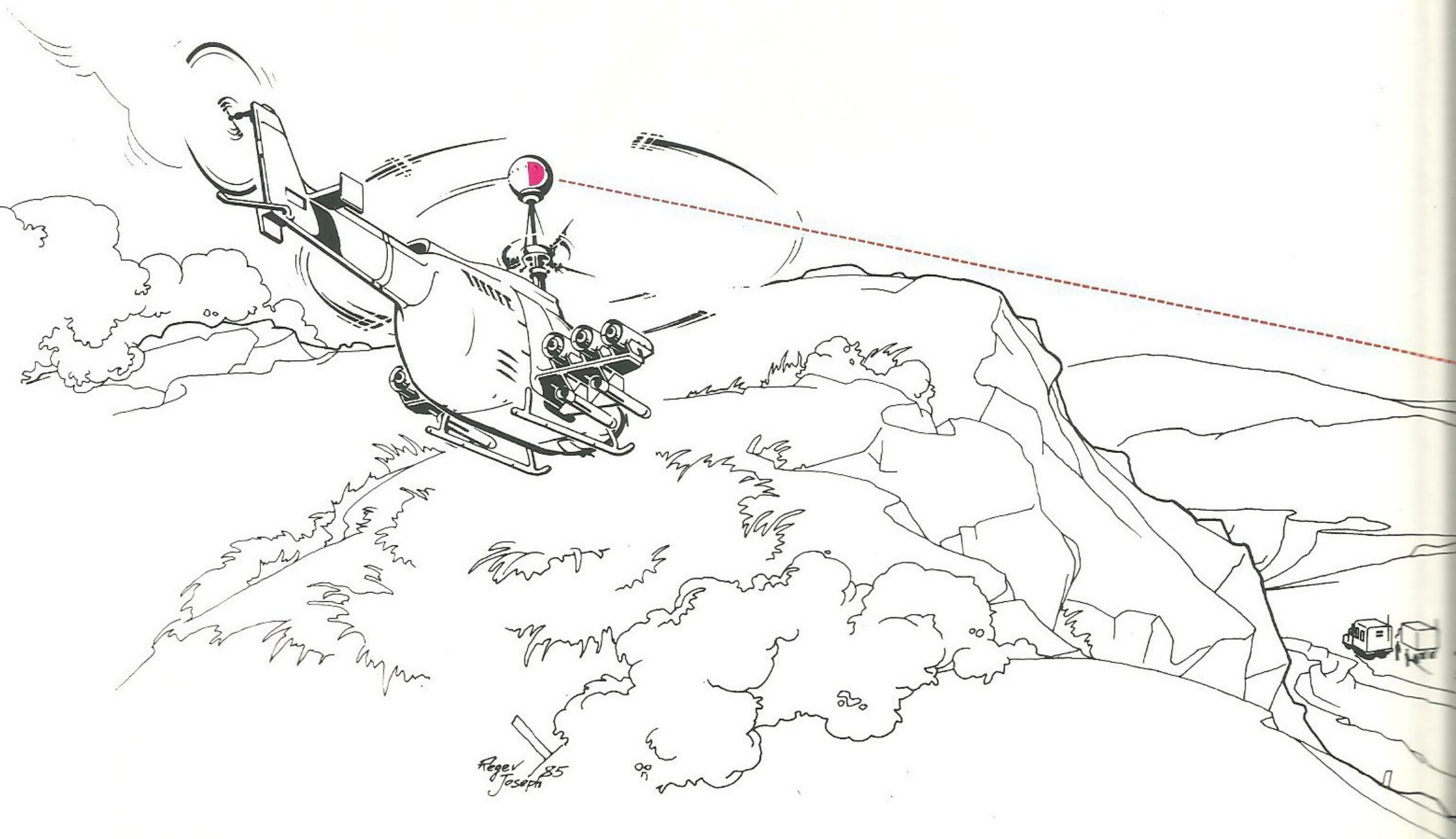

DANGER!
LASER
RADIATION

HIGH SPEED LASER RANGEFINDING IN A SYSTEM THAT IS VERY LIGHTWEIGHT, COMPACT, MODULAR AND VERSATILE


Regev
Joseph
85

INCREASED ACCURACY IN THE MOST CHALLENGI

Very Lightweight Laser Rangefinder

The VLLR (Very Lightweight Laser Rangefinder) incorporates leading edge technologies and extensive combat feedback. It responds directly to the need for greater accuracy, particularly when aiming at moving targets. It upgrades existing pods/platforms, and enhances the capabilities of new systems. Lightweight and compact, it can make a vital contribution to a variety of airborne systems, including RPVs, as well as to seaborne and ground platforms.

Developed, manufactured and tested by El Op, the VLLR reflects the know-how and experience of a Systems House concentrating under one roof all the major electro-optic technologies, supported by continuous interaction with the defense experience of modern armed forces. These capabilities, together with a high level of vertical integration, have made El Op a technological leader and major supplier in its field.

ADVANTAGES

- **VERY LIGHTWEIGHT** — enhances pod/platform capabilities without affecting stability
- **COMPACT** — integrates easily into a variety of systems
- **MODULAR** — adaptable to different systems and objectives
- **HIGH SPEED** — sends up to 6 laser pulses per second
- **RUGGEDIZED** — meets severe environmental conditions
- **VERSATILE** — microprocessor controlled; applicable to airborne, seaborne or ground systems
- **CUSTOMIZED HOUSING** — according to customer specifications
- **TROUBLE-FREE MAINTENANCE** — malfunction indicator, outside test pins, plug-in PC boards

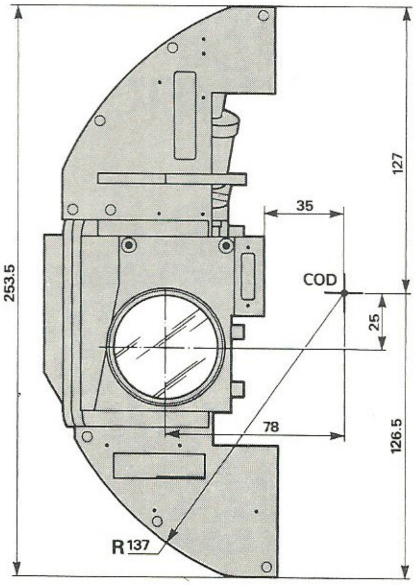
FEATURES

- **HIGH EFFICIENCY**
- **LOW HEAT DISSIPATION TO POD**
- **LOW DIVERGENCE OF LASER BEAM**
- **ADD-ON FEATURES AVAILABLE**

GING COMBAT ARENAS

VLLR-1

Very Lightweight Laser Rangefinder



TECHNICAL DATA

Transmitter

Wavelength: 1.064 um (Nd:YAG)

Output energy: 80 mJ

Pulse repetition frequency: Single shot, up to **6** pps

Beam divergence: Less than 0.4 mrad (for 90% of the output energy)

Pulse width: 15 nsec nom

Mounting accuracy: 1mRAD max

Boresight (retention): Less than 100 urad

Heat dissipation (into payload): Less than 30W

External sync.: Available

Receiver

Extinction: 40db min

Range: 200 to 9995 m

Range accuracy: ± 5m

Communication: Serial Data Link

Electrical Interface

Max. power consumption: 220 W

Mechnical Interface

Weight: Less than 3.8 kg.

Dimensions: See drawing

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LORROS

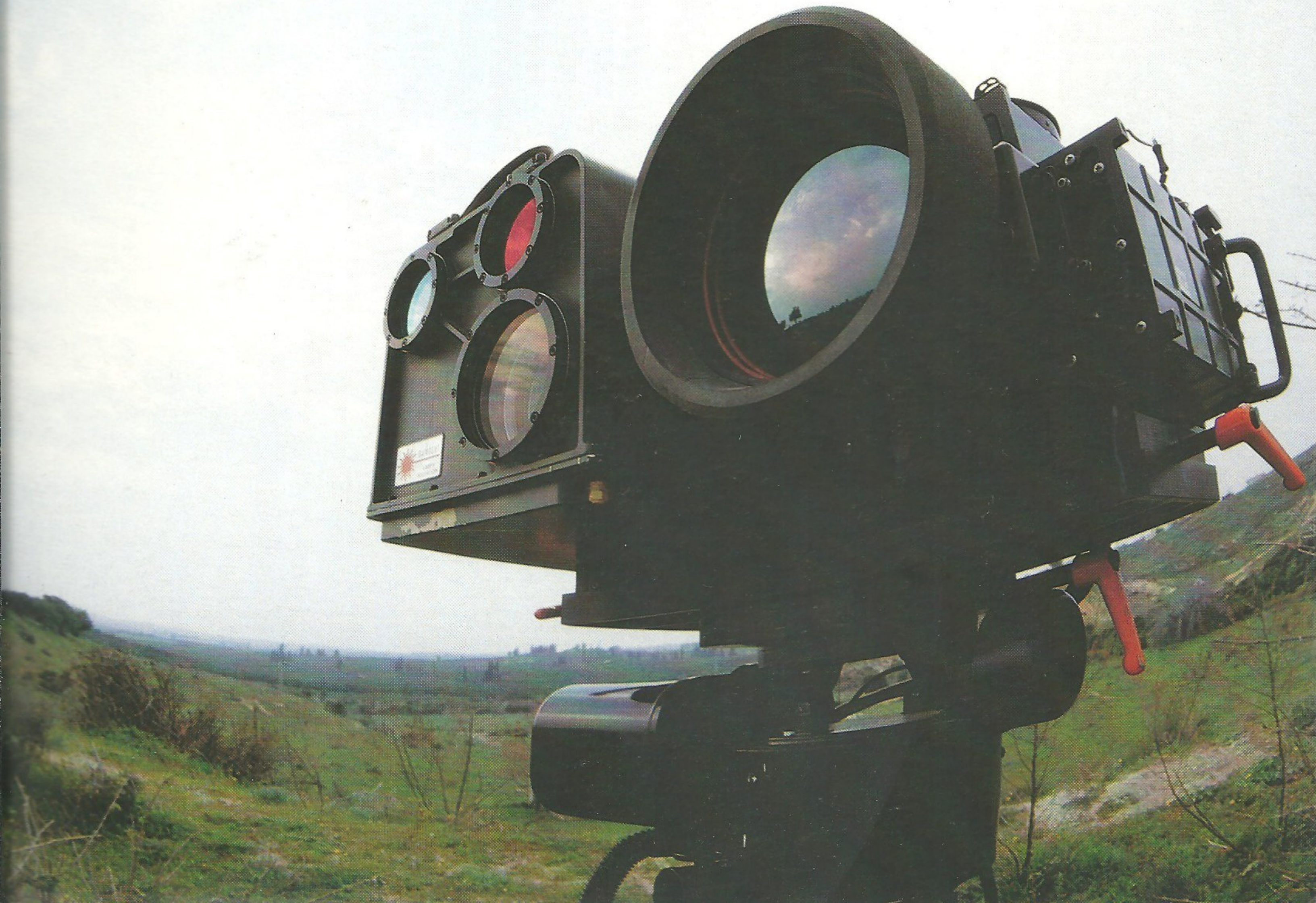
Long-Range Rreconnaissance and Observation System

FEATURES

- Very long-range day/night observation
- Immediate target ranging
- Az/El/R to UTM and UTM to Az/El/R coordinates transformation
- Six self-positioning and north finding methods
- Pattern learning and scanning capability
- Target to target jogging capability

APPLICATIONS

- Reconnaissance
- Artillery spotting
- Site security
- Border surveillance
- Drug enforcement



LORROS

Long-Range Rreconnaissance and Observation System

TECHNICAL DATA

Observation head

Dual independent Fields of View	
- Narrow FOV	0.5° (0.25° optional)
- Wide FOV	1°-2.5° by zoom
Typical recognition ranges	
- Tank	20 km
- Building	40 km
Cameras	2/3", high resolution, CCD type
Beam divergence	0.3 mRad
Range accuracy	±5.0 m
Rangefinder coverage	40 km

FLIR (optional)

Fields of View	
- Electronic zoom	0.8°x0.6°
- Narrow FOV	1.65°x1.25°
- Wide FOV	4.5°x3.5°
MRTD (NFOV)	0.5°C (at 5.5 Cy/mRad)
Cooling	77°K by nitrogen or closed cycle cooler

Pedestal

Azimuth coverage	350°
Elevation coverage	±15°
Microprocessor controlled servo drivers	
High angular accuracy	

Computer

- Miniature, military, PC/AT compatible
- RS-232, RS-422 Interfaces
- Ruggedized PC/AT compatible laptop (option)

Monitors

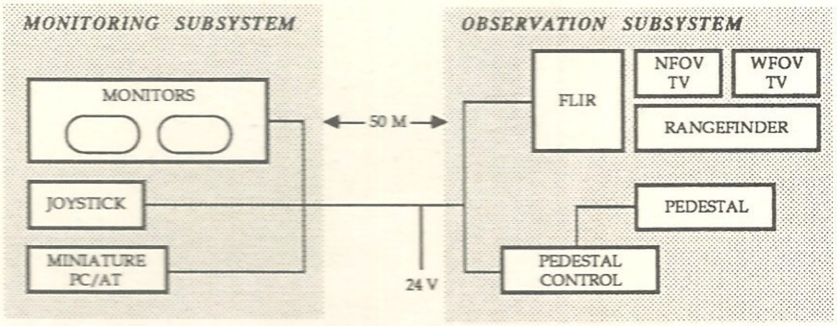
- Dual independent 7", high resolution monitors in a common case

Weight

Observation head	17 kg
Pedestal (inc. cont. box)	24 kg
FLIR	12 kg
Monitor	15 kg
Computer	3 kg

Power supply

Vehicle batteries	24 Vdc


MONITORING SUBSYSTEM
MONITORS
JOYSTICK
MINIATURE PC/AT
50 M
24 V
OBSERVATION SUBSYSTEM
FLIR
NFOV TV
WFOV TV
RANGEFINDER
PEDESTAL
PEDESTAL CONTROL

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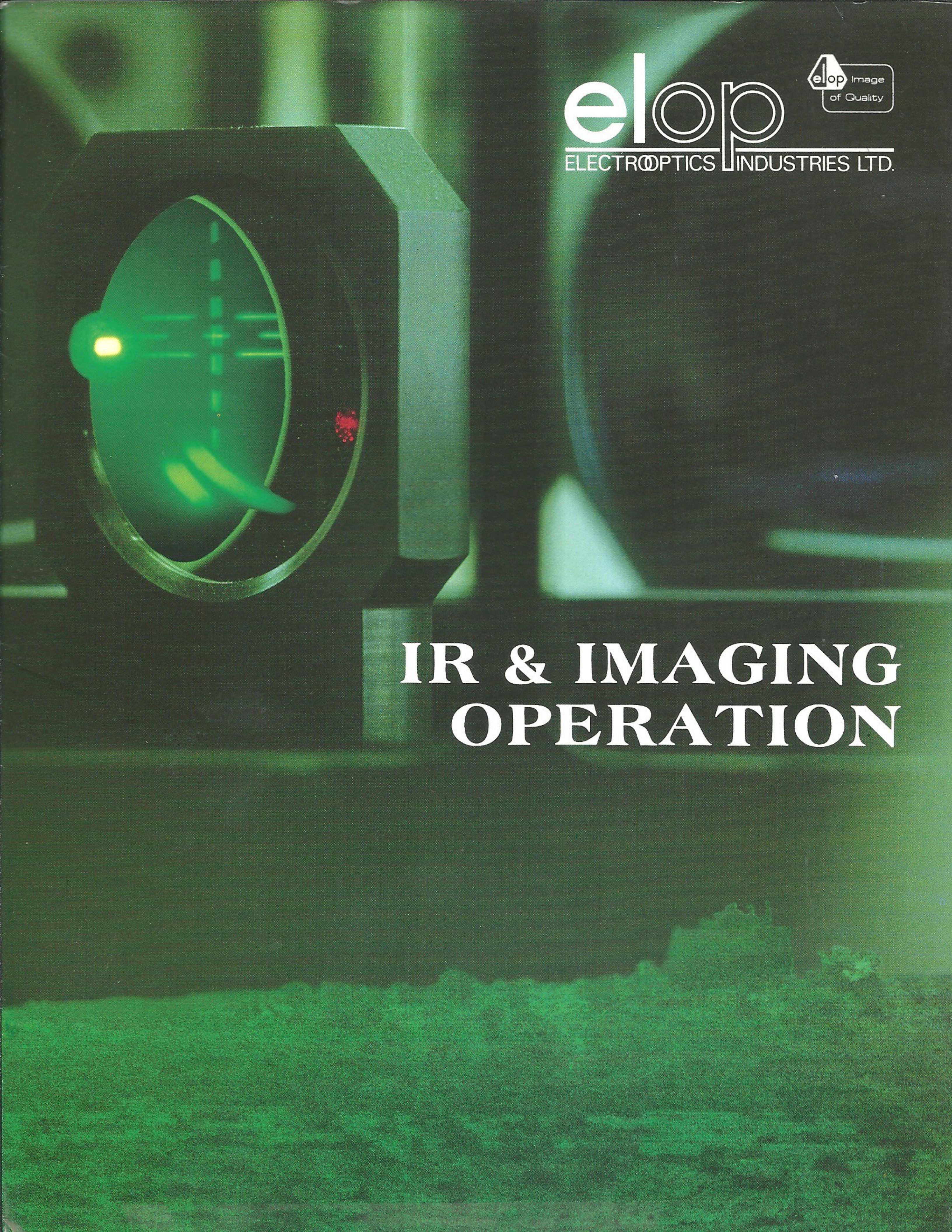

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IR & IMAGING OPERATION

IR & IMAGING OPERATION

EL OP is Israel's largest electro-optical Systems House, and a recognized international leader in terms of technology and proven performance. The Company's products are marketed to armed forces and defense manufacturers worldwide.

The thermal imaging systems developed and produced by **EL OP's IR & Imaging Operation** are fully operational. They are supplied to customers in Israel and abroad. The IR & Imaging Operation is responsible for all the Company's Infra Red (IR) and imaging military programs, with capabilities extending across every program phase, from initial conceptual studies through system integration, testing and field support.

These activities are backed by **EL OP's** advanced manufacturing facilities, including precision mechanical fabrication, optical element production and coating, automated electronic assembly, stringent testing, and other related facilities.☐

PRODUCT RANGE
Among the Operation's recognized achievements are:

☐ Thermal sights for armored vehicles
☐ RPV thermal imaging camera
☐ Image intensifier sight
☐ Passive driver viewer
☐ Naval and land based IRST
☐ FLIR video tracker

TECHNOLOGIES AND CAPABILITIES

DEVELOPMENT

A dynamic and experienced team of scientists and engineers is responsible for converting current and emerging technologies into operational systems adapted to a rapidly changing combat environnment.

Image Processing

- Automatic detection algorithm development
- Image data compression and coding
- Image enhancement and sensor automation
- Video target tracking

Optical Design and Engineering

- Design of optical systems in the IR and visible spectrum, aided by state-of-the-art software (SYNOPSIS, CODE V, proprietary modules)
- Performance analysis, including adverse environmental influences
- Development of alignment and testing techniques, aided by a complete laboratory, including MRT station, MTF station, IR interferometer, etc
- Optical engineering — scale up of design to manufacture of operational products

PRODUCTION AND QUALITY ASSURANCE

EL OP's volume production capacity is the backbone of the IR & Imaging Operation's ability to deliver large series characterized by the highest quality. Furthermore, in order to achieve the volume production rates, fast turnaround times, low cost and stringent quality demanded by defense markets, the Operation has established the largest FLIR assembly and test plant outside the United States. This fully integrated facility sub-contracts component production and assembles electro-optical systems.

In addition, a Fast Response Manufacturing Lab produces prototypes, jigs and fixtures — significantly streamlining the transition to production.

All in-process production is fully monitored by the QA and development teams.

Imager Assembly

- Receiver radiometric test station
- Imager calibration

Optical Assembly and Alignment

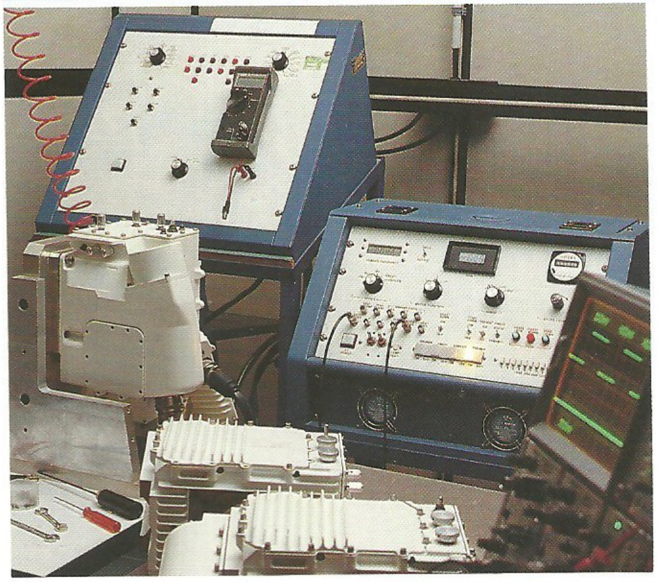
- Assembly of precision optomechanical devices
- Automated alignment station
- Telescope boresighting, confocality adjustment
- MTF computerized test station
- IR interferometric test station for testing of optical elements and assemblies

System Engineering

- Analysis of operational requirements; translation into system concept; definition and specification
- System feasibility studies supported by a field experiment and radiometry team
- Interactive performance prediction utilizing standard and in-house developed software to simulate all aspects of targets, background atmosphere, system design parameters and the effects of dynamic platform behavior
- Establishment and updates of data base library
- On-going study of new technologies

Electronics

- Specialized low noise amplifiers
- Fast A/D conversion and multiplexing
- Digital scan converters
- Analog and digital adaptive filters and signal processors

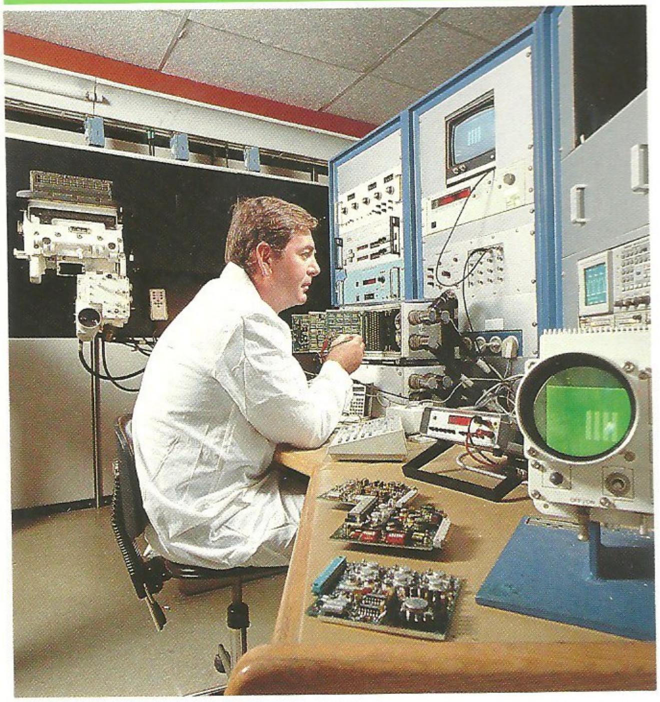


Focal Plane

- Focal plane and detector definition and design
- Computerized evaluation and test of detectors
- Cooler definition and integration

Mechanics

- Computer-aided design of precision optomechanical and electromechanical devices
- Finite element capability in static and dynamic analysis
- Thermal design and analysis
- Utilization of standard and proprietary software (EUCLID, SINDA, MSC NASTRAN, etc.) to integrate optical, mechanical and thermal programs



System Integration

- Assembly of complete IR sensor
- Calibration of sensor and electronics
- Functional radiometric test stations

Incoming Inspection

- 100% inspection of all standard components
- Automated detector test stations
- Special electromechanical components test station (scanner, display, etc.)
- Automatic PCB test station

Focal Plane Assembly

- Precision optical assembly
- Automated alignment of assembly
- Automated test

Burn In

- MRI test station
- Environmental test

Final Testing

- Acceptance system test station
- Boresight retention station

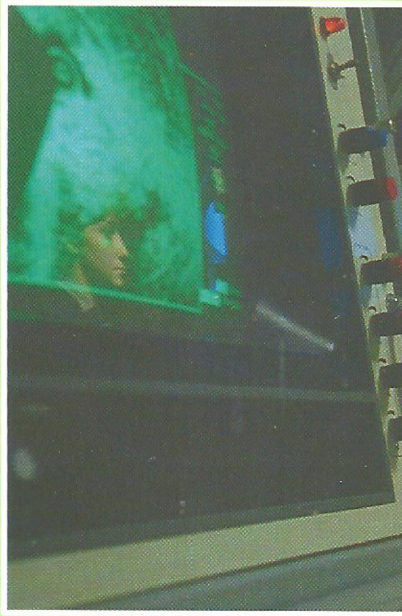
elop GENERAL OVERVIEW

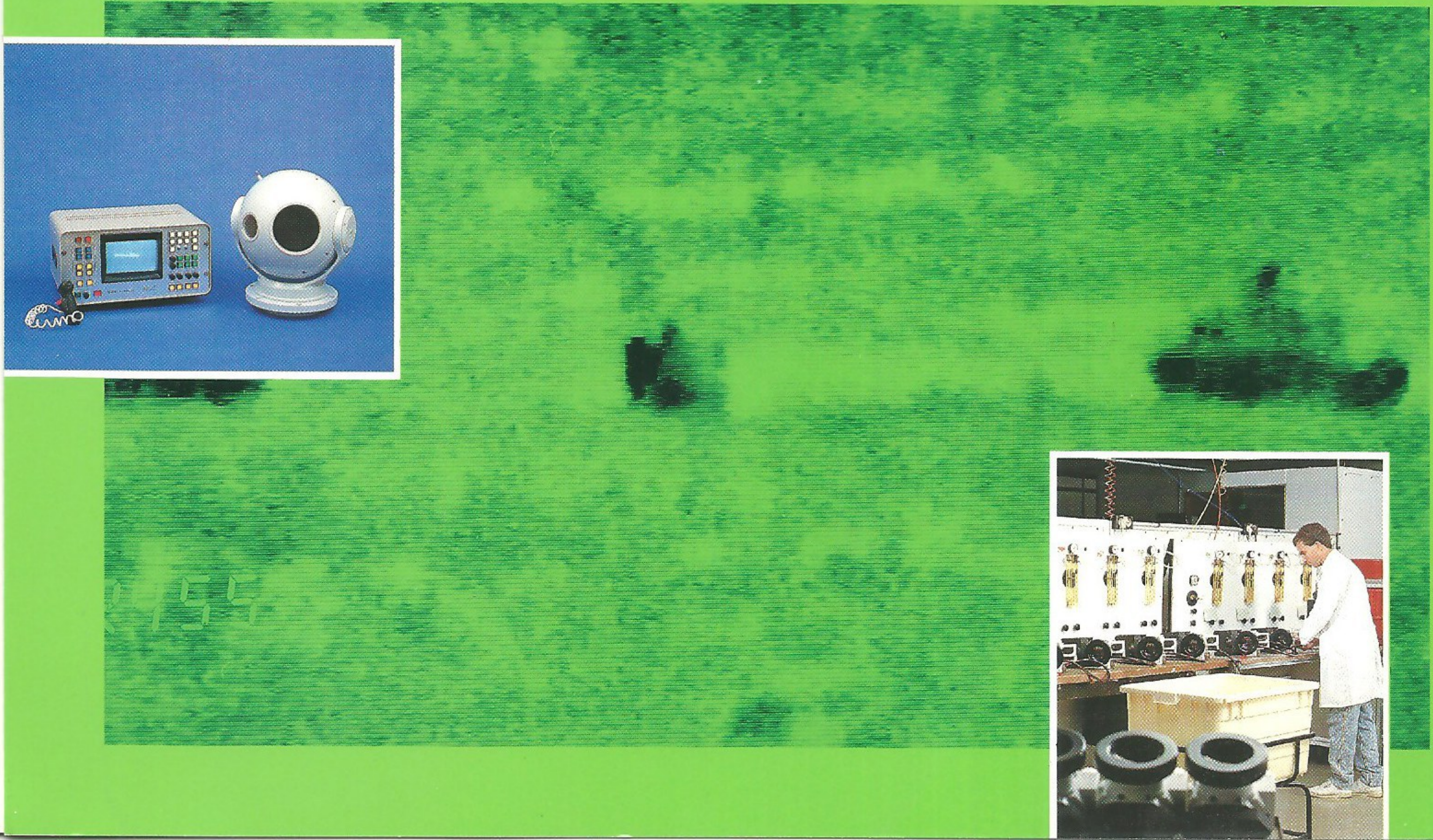
Established in 1937, **EL OP** has applied state-of-the-art technologies and major investments in facilities and R&D to become a recognized supplier of electro-optical systems.

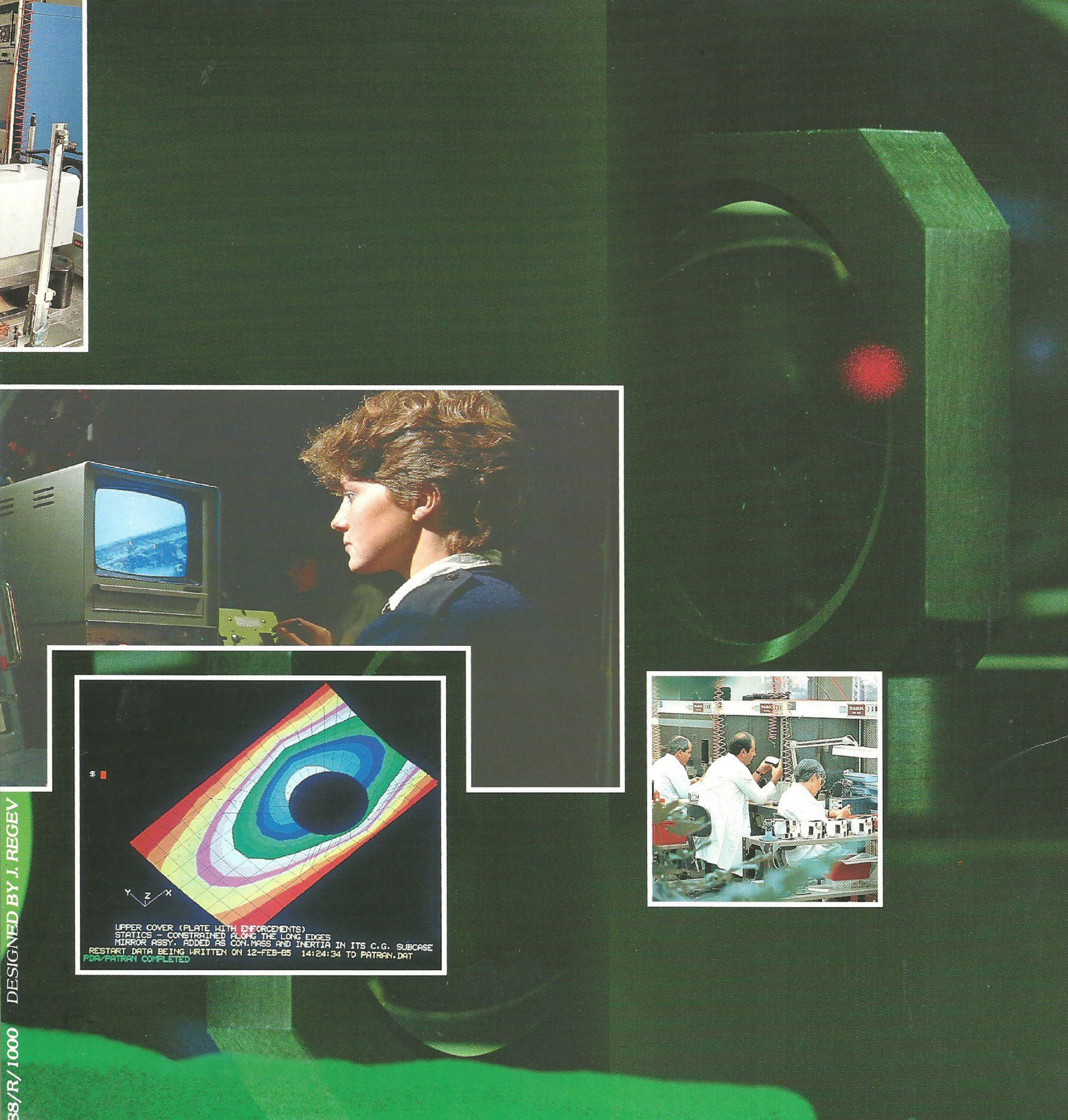
The Company cooperates with leading research institutes and has reciprocal manufacturing and licensing agreements with companies in Europe and the United States.

EL OP's 1200 employees include over 550 scientists, engineers and technicians. They are organized into separate operations, each responsible for carrying out programs in a specific area: lasers, thermal imaging, avionics, fire control systems and long range reconnaissance systems.

In addition to each operation's unique capability, advanced common support services are provided, including facilities for: optical production; optical coating; holography; dynamic environmental tests; line-of-sight stabilization development; metal plating; mechanical fabrication.□







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RED TIGER

DEFINITION:

- Automatic Fire Control System with Thermal Sight. Designed for upgrading of T-series and Centurion tanks (simple adaptation for other tanks)

MAIN COMPONENTS:

- Peritelescope (Head Mirror • Body Assembly Mini Laser Rangefinder • Thermal Elbow)
- Commander's Display Unit for day/thermal sight
- Ballistic Computer Group (computer and sensors)

PERFORMANCE:

• Elevation coverage	from −10° to 20°
• Compensation angles	
– Elevation	−1 to 99 mils
– Deflection	±40 mils (day)
• Laser range measurement	300 – 9900 m
• Day sight	x 8 with an 8° FOV x 1 with an 24.5° x 21.5° FOV

FEATURES:

- Modular design • Easy to install • High accuracy • High first round hit probability
- Easy operation and maintenance
- Same basic configuration for thermal and image intensifier version

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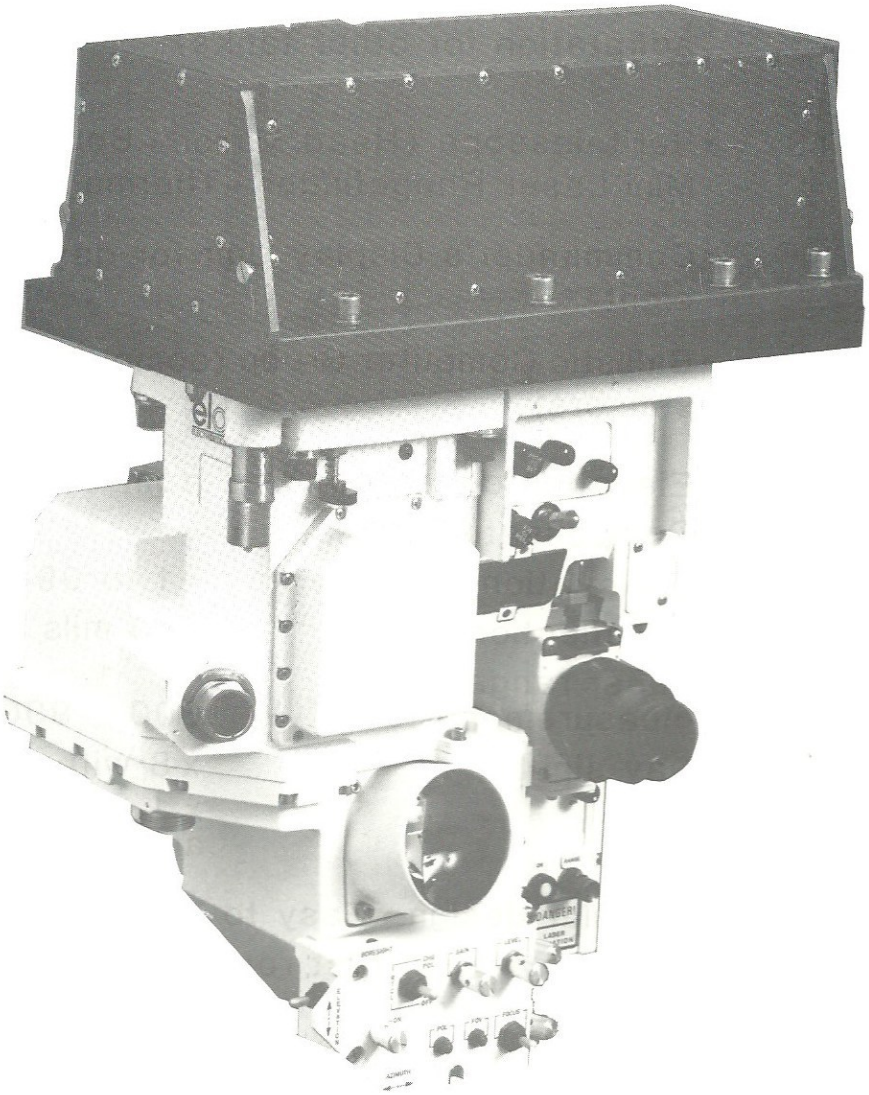
RED TIGER

GUNNER'S PERITELESCOPE

(with THERMAL ELBOW and MINI LASER RANGEFINDER)



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PAL

Portable Advanced Laser

GENERAL

- The use of designators for pointing at targets has proven its high efficiency in the battlefield.
- The PAL is a day/night laser designation system used as part of a weapon system together with laser guided missiles or projectile bombs.
- The PAL is a very cost effective solution for stand-off designation missions in the battlefield.

SYSTEM TASKS

The system tasks are:

— Designating stationary or moving targets for all types of munitions, homing on laser spots.

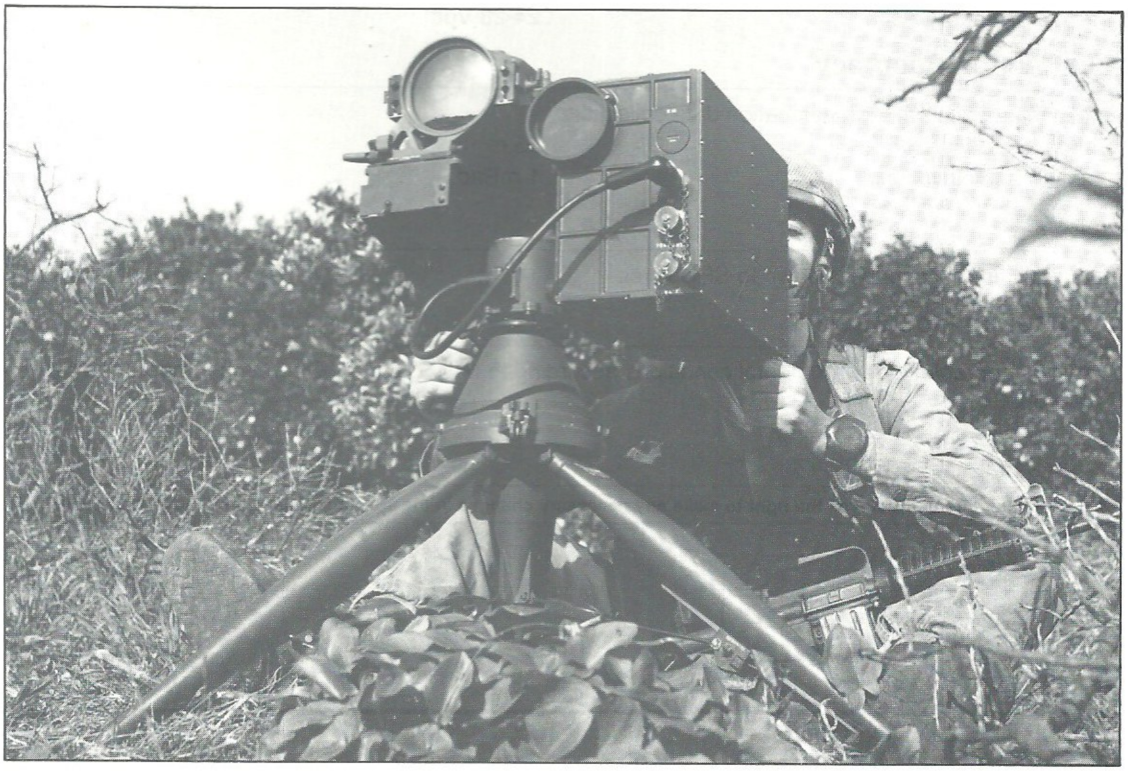
— Collecting target information, with accuracy of target acquisition (range, azimuth and elevation).

— Marking targets for laser spot tracking sensors.

The system is designed to operate during day and night and under severe weather conditions.

FEATURES

- Adaptable to stabilized platforms (land, naval and airborne application)
- TV Channel (optional)
- Thermal Sight (TAS-4,6, MTIS, etc.) Adapter (optional)
- Modern communication link (software adaptable protocol)



PAL day/night configuration

PAL
Portable Advanced Laser

TECHNICAL DATA

DEFINITION

A high performance ground vehicular day/night designation system

MAIN COMPONENTS

Designation Head • Tripod + Pedestal • Option: Thermal Sight Add-On

PERFORMANCE

Designation Range

■ Day	8 km
■ Night (with optional Thermal Sight)	6 km (recognition range limited)

Laser

■ Output Energy	130 mJ
■ PRF	Up to 20 pps (contin.)
■ Beam Divergence (90% of energy)	130 μRad

Rangefinder

■ Range	250-20,000 m
■ Accuracy	±5 m
■ Logic	First/Last

Sight

■ Day Direct View Optics	x 13 (FOV 5.5°)

Weight

■ Designation Head	11.5 kg
■ Option MTIS (Modular Thermal Imaging System)	12 kg

Power

■ Vehicle or Battery Pack	24-28 Vdc

Data Collection Accuracy

PAL is capable of accurate target location data collection:

■ Range accuracy	±5 m
■ Azimuth and elevation	1 mRad

BIT

PAL has a built-in-test capability down to SRU level.

Environmental Operation

The system is operable in environmental conditions according to MIL-STD-810. Operating temperature range is -31°C to +45°C.

The manufacturer reserves the right to make any necessary changes in the specifications without advance notice.

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